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REPORT RESUMES

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AN EVALUATION OF EDUCATING MENTALLY HANDICAPPED CHILDREN IN SPECIAL CLASSES AND IN REGULAR CLASSES.

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AN EVALUATION AND OBJECTIVE COMPARISON WAS MADE BETWEEN THE PROGRESS OF YOUNG MENTAL RETARDATES IN REGULAR CLASSROOMS WITH THE PROGRESS OF PEERS IN SPECIAL CLASSES. THE BASIS OF COMPARISON OF THE TWO TEACHING METHODS INCLUDED MENTAL DEVELOPMENT, PROGRESS IN REGULAR SCHOOL SUBJECTS, ACHIEVEMENT TOWARD OTHER EDUCATIONAL GOALS, SOCIAL ADJUSTMENT INSIDE AND OUTSIDE THE CLASSROOM, AND PHYSICAL GROWTH AND COORDINATION. THESE PROBLEMS WERE STUDIED IN A LARGE NUMBER OF DIFFERENT SCHOOL ENVIRONMENTS, INCLUDING RURAL SCHOOLS AND LARGE AND SMALL CITY SCHOOL UNITS. WHEN THE STUDY WAS CONCLUDED AND ALL DATA WERE ANALYZED, OVERALL SOCIAL AND PHYSICAL PROGRESS SEEMED TO FAVOR THE SPECIAL CLASSES. HOWEVER, THE RESULTS SHOWED THAT THE SUBJECTS DID BETTER ACADEMIC WORK IN A REGULAR CLASSROOM THAN THOSE WHO WERE PLACED IN A SPECIAL CLASS. EXPLANATIONS FOR THIS FACT ARE OFFERED. (JH)

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AN EVALUATION OF EDUCATING MENTALLY HANDICAPPED CHILDREN IN SPECIAL CLASSES AND IN REGULAR CLASSES

Thelma Gwinn Thurstone, Principal Investigator

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SECTION I

SUMMARY OF METHODS AND RESULTS

This report consists of a number of studies of the development of mentally handicapped children in the public schools of North Carolina. The studies are grouped under the title AN EVALUATION OF EDUCATING MENTALLY HANDICAPPED CHILDREN IN SPECIAL CLASSES AND IN REGULAR CLASSES. This title suggests that a comparison was to be made between the results of educating mentally handicapped children in regular classes and in special classes. This has, as a matter of fact, been one of the principal objectives of several of the studies; but we have also been interested in several other variables which might influence the education of mentally handicapped children, whatever their school placement. Among these we should mention sex, race, level of intelligence (Binet I. Q.), and chronological age. The relations between these variables and the development of a large group of mentally handicapped children have been studied, and an analysis of variance has been made of the interaction of these main effects upon the measures of the children's achievement in a number of areas.

The areas of the children's development which have been studied are gross motor skills, social development, academic achievement, and intellectual growth. Several contacts were made with each child, and the data collected on each of our 1300 children are very extensive. Practically all of the testing, both Binet and group testing was done by the research associates. None was done by teachers.

The report is divided into several sections, each of which presents the objectives, results, and methods of study and analysis which were used. It seems, important, however, to draw together the results of the various studies and to try to make some interpretation of them.

The most significant generalization which can be made from a consideration of all the studies is that the mentally handicapped child achieves very much less in a school than normal children of the same mental age, and achieves less than we might have expected him to do. It should be remembered that the group which we have studied here, Binet I. Q. 's from 50 through 79, are the group who are usually defined as the educable mentally handicapped. This is interpreted by the present writer to mean that these children are capable of more than training, that they are able to accomplish a certain degree of academic achievement. The fact that the children have not achieved as much as we might have anticipated that they would does not necessarily mean that they are not able to do it. The explanation may be that we still have not found all of the answers in curriculum, methods of instruction, and teacher attitudes and training which are necessary for the successful education of this group.

Professor Jordan's studies of the social adjustments of these children indicate that when the mentally handicapped child is in a regular classroom, he is very likely to be a social isolate. He does not receive as favorable ratings on personality traits as do normal children in the class, whether these ratings are made by other pupils or whether they are made by teachers. The mentally handicapped children in special classes seem to be better adjusted in school and to have more friends than the mentally handicapped children in the regular classes. These results seem to present a very strong argument in favor of placing mentally handicapped children in special classes.

In the gross motor skills studied by Professor Peacock, mentally handicapped children are consistently inferior in their accomplishments to normal children of comparable age. This is true for both sexes and for all ages.

The studies of the primary mental abilities of the mentally handicapped children indicate a generalized deficiency of these children at all ages. The profiles of abilities for three intelligence levels are strikingly similar. It is not felt, however, that the data are sufficient to draw conclusions about the rates of development of these abilities for handicapped children as compared with normal children. We are hoping to pursue this phase of the study farther.

In the area of academic achievement, studies of the main effects of several variables as well as the interaction effects of these variables indicate that the differences for boys and girls are frequently significant, and that the differences between White children and Negro children are seldom significant, that there are significant differences for three levels of intelligence -- 50 to 59 I. Q., 60 to 69 I. Q., and 70 to 79 I. Q., with the brighter children achieving more in absolute scores, but falling farther short of their mental age expectancy in school achievement than do their more handicapped classmates. When three levels of age groups are considered, it is quite clear that the older children fall considerably farther short of expectancy than do the younger ones. Many people who have worked with the education of handicapped children feel that their intellectual development could proceed considerably beyond the age of sixteen years. It is possibly a matter of the attitudes of these children and their teachers that is responsible for our finding the intellectual development fading off rather sharply before we should have expected it.

Certain facts which are found from one study to another deserve mention. In the first place the one subject in which the mentally handicapped children come nearest to accomplishing their predicted score is the arithmetic computation tasks. Since the test of this ability is represented by numerical calculations and the speed of making them, it is suggested that mentally handicapped children can profit more in school from a subject which is dependent largely on drill and rote memory than from material which involves more thinking and reasoning.

Spelling is another subject which has behaved rather consistently in showing the widest variability in the group and sometimes almost as high scores as the arithmetic computation. Again, the interpretation is made that the explanation may lie in the fact that spelling is often a matter of rote memory.

The finding is consistent, however we have tried to approach the problem, that the mentally handicapped child in school is doing better work in the regular classroom than he is doing when he is placed in a special class. It is necessary to try to find an adequate explanation of this fact. Many have been suggested, and we are not able to choose the ones which are the most significant. It is quite possible that all of them have some relevance.

It has been suggested that the mentally handicapped child profits, academically and intellectually, from the stimulation of being in a classroom with normal children. This is perhaps true to some extent.

It has also been suggested that children's motivation is diminished when they are placed in the special classes. We have no data on this subject.

Teachers in the regular classrooms in our public schools are often willing to keep in their rooms children who they know are mentally handicapped if they feel that these children are doing the best they can and if the children are making even a little academic advancement. It is quite likely that since the facilities for special education are limited, the available places are more frequently assigned to the children who have failed to make academic achievement before they are placed in special education. This factor alone could account for our finding that the mentally handicapped children in regular classes are doing better academic work than children in the special classes, and is to us the most attractive of the explanations that have been offered.

Another explanation of this finding is that the special classes do not emphasize academic achievement to the extent that the regular classes do. The teachers and supervisors of these children, it is said, know that there are other things more important for these children than academic achievement, and so do not emphasize it. This explanation probably has a great deal of validity.

After trying for three years to find the variables which influence the achievement in various areas of development of mentally handicapped children, we only recently made a tabulation of the variation in achievement for forty-seven schools. Some of these schools represent several classes, as will be seen from the enrollments. Table 1 shows in rank order the results obtained in forty-seven schools as measured by the change in Battery Median score on the Stanford Achievement test from one achievement testing to a second achievement testing almost a year later. The school which is ranked number one here obtained a change of +.8 of a year in the children's achievement; the school which is ranked number forty-seven obtained a change of + .05 grade as a result of one year's school work. This is a tremendous scatter and seems almost to imply that it is futile to search statistically and experimentally for the variables influencing the education of the mentally handicapped child. The table contains several other factors which we thought might be related to the achievement factor, but none of the correlations are striking. We have tabulated the number of children in the class, the average I. Q. of the children in the class, the amount of time (full time or half time) spent in special education, and the deviation from expectancy of the group at the time of the first testing. There is a slight tendency for the children who were brighter to have achieved a little more, but this is not marked. One of the best gains was made by school number fifteen, which is a state residential school for mentally handicapped children in which the group in the classrooms had an average I. Q. of 58, the lowest of any of the schools listed.

Teachers vary considerably in the objectives which they hope to reach with a class of mentally handicapped children; they vary considerably in their ability to reach the objectives which they have set. The effect is an unreasonably high variability in the results obtained with mentally handicapped children. As in many other educational studies, we must conclude that the most important element in the whole situation is the teacher.

Toward the end of our study one of the research associates collected data on the attitudes of the teachers toward various areas of achievement for the pupils

and is planning to treat the data statistically. Perhaps the results of that study will explain the ambiguities and contradictions which we have so frequently met in our studies.

TABLE 1

SCHOOL VARIATION IN ACHIEVEMENT GAINS

School	Time in Special Class	Race	No. of Pupils	Average Age in Months	Average Binet I.Q.	Average Deviation Score	Average Achievement Gain
1	F	W	6	164	65	-1.01	.80
2	1/2	W	12	140	63	- .44	.77
3	1/2	W	13	140	68	- .32	.76
4	F	W	3	113	64	- .27	.67
5	F	W	5	115	72	-1.00	.60
6	F	W	4	121	64	- .12	.60
7	F	W	13	124	71	- .90	.58
8	F	W	9	151	68	-1.23	.53
9	1/2	W	8	129	72	- .56	.52
10	F	W	28	157	68	- .51	.51
11	1/2	W	17	130	66	- .49	.50
12	1/2	W	9	134	65	- .36	.49
13	1/2	W	11	142	65	- .56	.47
14	F	W	10	133	66	- .03	.46
15	1/2	W	81	163	58	- .81	.45
16	F	N	8	122	68	- .70	.45
17	1/2	W	2	150	74	-1.70	.45
18	1/2	N	4	112	71	- .55	.45
19	1/2	W	11	168	73	-1.00	.45
20	F	W	12	133	64	.04	.42
21	F	W	15	124	66	- .15	.42
22	F	N	9	163	64	- .84	.42
23	1/2	N	11	142	65	-1.33	.41
24	F	W	14	157	69	-1.36	.41
25	1/2	N	25	134	62	- .15	.39
26	F	W	10	148	65	- .92	.39
27	1/2	N	16	128	66	- .35	.38
28	F	N	6	127	66	- .68	.37
29	F	W	3	134	68	-1.00	.37
30	F	W	17	172	66	-1.34	.36
31	F	N	12	135	67	- .58	.36
32	1/2	W	11	138	66	- .85	.35
33	F	N	9	126	67	- .96	.34
34	F	W	3	152	64	- .77	.33
35	F	W	27	138	68	-1.10	.32
36	1/2	W	12	175	67	-1.12	.32
37	1/2	W	13	136	68	- .09	.32
38	1/2	W	8	174	63	-1.66	.31
39	F	W	4	158	76	-1.28	.30
40	1/2	W	7	177	70	-1.68	.28
41	F	N	10	150	61	- .54	.28
42	1/2	W	11	171	73	-1.83	.25
43	F	W	6	149	63	.00	.25
44	F	W	3	130	77	-1.03	.23
45	F	W	6	174	60	-1.25	.15
46	1/2	N	1	150	63	.10	.10
47	F	W	2	179	63	-1.03	.05

SECTION II

ACADEMIC ACHIEVEMENT OF MENTALLY RETARDED CHILDREN

FIRST ACHIEVEMENT TESTING

This section on the first achievement testing presents an analysis of the results of the first contact which we had with any child, either in special classes for the mentally handicapped or in the regular classes. The earliest of these contacts were made in the spring of 1957. Some of these children were seen again, and, as a matter of fact, about sixty per cent of them were retested. We made an effort to retest as many children as possible after not less than seven months of school. It was not possible to make the period longer than this in some cases, though in many it was considerably more than one academic year. It was our practice, however, to continue to test children as long as we found them even if they were new cases added to the general category "first achievement testing" during the academic year 1958 to 1959.

Our first contact with the child was nearly always the individual administration of the Binet test. This was the rule and it was followed in almost all cases. In this way we eliminated from our experimental groups children with intelligence quotients on the Binet test lower than 50 and those with intelligence quotients higher than 79. As mentioned earlier, the administration of the Binet test was done by the research associates on the project. In a few cases the results of a school psychologist on a recent Binet examination were accepted.

THE EXPERIMENTAL DATA

As soon as possible after the administration of Binet tests in school, the appropriate level of the Stanford Achievement Test was administered. This was always done in small groups. Again, none of the tests were teacher administered, all of the examining being done by the full time staff of the project. As close as possible to the time of the administration of the achievement examination the appropriate form of the Primary Mental Abilities test was administered. For the level of age and intelligence with which we were working, we found it necessary to use only the form for ages five to seven and the form for ages seven to eleven.

For an evaluation of the academic progress of the children before they became a part of our study, three scores on the Stanford Achievement test were determined. The first of these was the grade equivalent score as furnished by the test norms. The second score recorded for each child was the deviation in grades of his actually obtained score from the score expected on the basis of his mental age. The third score was the ratio of his actual achievement to predicted achievement. These last two scores will be explained somewhat more fully.

Assuming that the average mental age of a child entering first grade is six years exactly, we assign an expected achievement score at the beginning of first grade of 1.0. If the child's mental age is seven years and zero months, we assign an expected achievement score of two years, zero months. If his mental age is six years and six months we assign a score of one year and five months as his expectation on the achievement test. It should be noted that we are here converting from a twelve months scale for mental age to a ten months scale of achievement on the Stanford Test. An expectancy was computed for each child on the basis of his mental age at the time he took the achievement test. These data were available in the form of his chronological age and his intelligence quotient on the Binet. For each of the five sub-tests of the Stanford Achievement test and for the battery median score, the expectancy was subtracted from the actual achievement. This is what is called the deviation score. If a child is an over-achiever, his deviation score is positive; if he is achieving less than we might expect on the basis of his mental age, his deviation score is negative.

It seemed obvious that the simple deviation score did not tell us all that we might want to know about a child's overachievement or underachievement. If a child with an expectancy of second grade has a negative deviation score of one year, he is quite seriously retarded. If he has a negative deviation score of one year when his expectancy is fifth grade, this one year deviation does not seem so serious. The measure chosen to take care of this circumstance is a ratio obtained by dividing the child's actual achievement by his expected achievement on the basis of his mental age. Thus, all of the ratio scores are positive. They have a lower limit of 0. 0, and theoretically there is no upper limit. As a matter of fact we did not compute ratio scores for children with less than first grade achievement expectancy. The reason for this is that if a child had any achievement at all, his ratio scores became fantastically high and seemed meaningless.

The first six tables in this section of the report present significant facts about the 1273 children included in the first achievement testing study. The reader may be interested to study the detail of these tables, but certain significant facts should be noted at this point.

In Table 1 we have a summary of the race and sex of the experimental population. It should be noticed that the number of White children is 912 while the number of Negro children is 361. This ratio was accepted as being about the same as the ratio of White to Negro children in the total school population of North Carolina. In the matter of boys and girls studied, it should be noticed that there were 797 male children and 476 female. This unevenness did not occur by choice, but is due to the fact that schools seem to be much more likely to assign boys to special education classes for the mentally retarded than they are to assign girls to such classes. We simply took the cases as we found them in the schools available to us.

Table 2 presents a summary of the age distributions for the total group of 1273. The three age groups which we studied do not contain the same number of children, but it was decided to keep them in whole year intervals rather than break them down into even-size groups with resulting variability in the size of the age interval concerned. It should be noted that the largest group is in every case at the age range of 11 to 13 years inclusive.

Table 4 presents the detail of distribution of age by school placement. The most significant observation from this table is that very young children are not often placed in special education. It is likely that the schools feel pressure to use their special class facilities for somewhat older children and also that they honestly and perhaps properly believe that very young children may be just as well cared for in the regular classes. At least they want to give them a very fair chance in the regular classes before assigning them to the special education classes. At the end of the distribution showing the frequencies for the higher ages of 15 and 16 years we notice that the frequencies decrease markedly again. This may be partly due to the fact that the older children who have not been allowed to make much academic progress in school are allowed to drop out, get work if they can; and it may also be partly due to the schools' feeling that there is not enough time left for them to gain much in special education. It is also partly due to the fact that this is the junior high school or high school age range, and special class facilities have not been available at that school level as generally as they have been at the elementary school level.

Table 6 presents a distribution of the number of months that children have been in special education. It will be noticed that the average number of months is higher for White children than for Negro children, due probably to the circumstance that special education classes for Negroes were not started as soon as those for White children. Field workers on this project, however, noted that a large number of classes for Negro children were being set up.

The significant facts about the group studied in the first achievement testing are given in these six tables, but it should be noted that these children are drawn from 83 different schools in North Carolina. All of these schools are a part of the public school system with the exception of the Caswell Training School which is a state-supported residential school for mentally handicapped White children. The 83 schools are widely distributed geographically throughout North Carolina and represent large city systems, small town school systems, and county school systems. It is felt that they are a representative sample of the schools which provided special education during the years of this study, 1957 to 1959.

RESULTS OF ACHIEVEMENT TESTING

Tables 7 through 18 furnish a comparison on the basis of the three measures described above namely, scores, deviations from expectancy, ratio of achievement to expectancy on the Stanford Achievement test for boys and girls, White and Negro students, students of three I. Q. levels, and students of three age levels. In each table are shown the average for each group, a comparison of different scores for the groups studied, and a measure of the critical ratio of the difference. An inspection of these tables reveals several significant facts which are summarized below.

There is a surprisingly low achievement of all children. Low scores are typical of the group whether we consider the separate scores in the Stanford Achievement test or whether we consider the battery median score.

There is consistency in all of the tables in the finding that in general the highest score is obtained in the arithmetic computation test and the next highest in the spelling section of the test. It is quite striking that these two abilities which depend rather heavily on rote learning and drill are the two areas of academic work in which the schools have been able to achieve almost normal progress for these children in terms of their expectancy.

The spelling scores consistently show the greatest variability.

In Tables 7, 8, and 9 the comparison of the scores of boys and girls shows that in nearly every instance the girls are somewhat better than the boys, the largest difference being in spelling, and that these differences are statistically significant as shown by the large critical ratios at the right of each table.

Tables 10, 11, and 12 show that there is little difference in the scores of Negro and White children but that the White children are farther from expectancy and have lower ratio scores than the Negro children. Again, most of these differences, though small, are statistically significant as indicated by the critical ratios.

Tables 13, 14, and 15 give a comparison of three Binet I. Q. groups: 50 to 59, 60 to 69, 70 to 79. As it is to be expected the children with the higher I. Q. have higher scores, but it is interesting to note that the deviation scores are greater for the children in the higher I. Q. groups. This is a surprising and somewhat disconcerting finding because it might have been expected that the brighter the child, the relatively better in terms of his ability he would do in school. Table 15 showing the ratio scores also indicates a performance in favor of the less intelligent groups. Again, most of the critical ratios show these differences to be significant.

Tables 16, 17, and18 show a comparison of achievement on the Stanford test for three age groups: 6 to 10 years, 11 to 13 years, and 14 to 16 years. Again, as is to be expected, the older groups show higher achievement, but the deviation scores and ratio scores are all in favor of the younger groups. The critical ratios for these tables are uniformly high, and it is hard to accept the conclusion, though we must, that the schools seem not to hold up in their effectiveness as these mentally handicapped children become older.

Some of the statements in this section of the report may be modified in terms of the interaction studies in a later section of this report.

SCHOOL PLACEMENT AND ACHIEVEMENT

The relation between achievement on the Stanford Achievement Test and the independent variables of the study might have included school placement as one of the independent variables. It is included here in a separate section because it is the major part of the study and because further break-downs of the special classes and regular classes have been made.

So far as we know there was no selective factor determining the schools in which we would study children in special classes and those in which we would study children in regular classes except the fact of the schools having special education or not having it. Special education for mentally handicapped children has been developing very rapidly in North Carolina in the last few years, and at the time we started this study there were many schools of fair size which did not have any classes for the mentally handicapped.

The practice in North Carolina is to assign children with I. Q. 's from 50 to 70 to special education classes where they are available. As a matter of fact, there are quite a number of children between 70 and 75 in the special classes, but the I. Q. 's in the special classes seldom go above this point. For the purpose of our study we have decided to include children in the range from 50 I. Q. to 79 I. Q.

It should also be pointed out that when the study was begun many of the special education classes available to us for study were operating on half-day schedules, that is, the children who were in special education were in the special classes for a half-day only and were in regular classes for the other half of the day. This situation changed very fast, however, and for most of the duration of the study and for most of the children studied, the children were in special classes for full days.

The first comparison which we shall examine is one between the total group of children in special classes and the total group studied in regular classes. There were 767 pupils in the special class group and 503 in the regular class group. It is much harder to find the mentally handicapped children in the regular classes because they frequently have not been identified and when we do find them there are usually only a few in each room. This makes the collection of data on the mentally handicapped children in regular classes much more difficult.

Tables 19, 20, and 21 show a comparison of these two major groups. Group 1 contains the children in special classes, and group 2 contains the children in regular classes. Perhaps the most conspicuous thing about these three tables is that all of the differences, scores of special education children minus scores of children in regular classes, are negative. This means that the mentally handicapped children in regular classes were achieving more academically as measured by the Stanford Achievement Test than the children in the regular classes. The size of the critical ratios indicates that these differences are highly significant in the case of all the measures on the Stanford Achievement Test with the exception of Arithmetic Computation. This immediately raises the question whether a drill subject or a rote memory subject is one in which the special education teachers have found that they can be most successful and so have put considerable emphasis on it. It is also obvious that any teacher would recognize the importance of a child's learning the basic arithmetic facts. One more fact in these three tables to which attention should be drawn is that spelling shows the greatest variability of all the measures on the Stanford Achievement Test. It seemed interesting to us that many mentally retarded children were actually quite good in spelling.

It is possible that certain of the subgroups do better in special education than others and so we have made comparisons for each of the variables stated in the early part of this section on the basis of the pupil assignment. The first one of these is the comparison between boys in special education and boys in regular education. The results of this comparison are shown in Tables 22, 23, and 24. The facts are the same as those for the total group. The mentally handicapped boys in regular classes are doing better work than mentally handicapped boys in special classes, the differences are significant in all the sub-scores except the arithmetic scores, and spelling shows the greatest variability.

Tables 25, 26, and 27 present the comparison for girls. The observations from the tables are almost identical to those just given for boys: the girls in special classes are not doing as good work in academic subject matter as the mentally handicapped girls in regular classes, the differences are highly significant in everything except arithmetic computation, and again spelling shows the greatest variability.

Tables 28, 29, and 30 present the next comparison which is of White children in special classes as compared with White children in regular classes. Again the columns of negative differences when the average achievement of children in regular classes is compared with the average achievement of children in special classes indicate that in the schools studied the mentally handicapped White children were doing better academic work in the regular classes. Some of the critical ratios do not show that these differences are as significant as some of those which we have been studying. Most all of them, however, are significant at better than the .05 level.

Tables 31, 32, and 33 give a similar comparison for the results obtained by testing Negro children. The differences here are slightly larger than in the previous three tables showing the comparisons for White children. They are again all in the negative direction when the averages of the regular class students are subtracted from the averages of the special class students. The critical ratios are higher than in the previous three tables with all but three showing a significance above the .01 level.

We must accept the evidence that in the case of White children and of Negro children the special classes are not obtaining as high academic achievement from the pupils as the regular classes are. There is a very slight difference in that the discrepancy between the children in regular education and in special education is less for the White children than for the Negroes, but this difference does not

seem to be very significant.

It is possible that special education is more effective with children at some of the levels of intelligence than at others. We have divided our group into three parts, children with Binet I. Q. 's between 50 and 59, those between 60 and 69, and those between 70 and 79. We have made a comparison of the academic achievement of each of these groups in special education with the corresponding group in regular education.

Tables 34, 35, and 36 gives a comparison of the achievement of children with Binet I. Q. 's of 50 to 59 on the basis of their school placement. As in all the previous comparisons the average scores of children in regular classes have been subtracted from the scores of children in special classes. All of the differences are negative, and all of the critical ratios show a high level of significance except, again, for the arithmetic computation scores. It is clear that for the children studied, academic achievement was better in the regular classes than in the special classes.

Tables 37, 38, and 39 gives a similar comparison for children whose Binet I. Q. 's range from 60 to 69. It will be noticed that all of the differences are negative, that is, in favor of the regular classes, except for the arithmetic computation scores. Again almost all of these differences are highly significant except for the case of arithmetic computation. We seem to have evidence here that in the I. Q. range 60 to 69, one which comes within the definition of special education in most schools, the children in this study were not at an advantage for being placed in special classes.

Tables 40, 41, and 42 show the comparison for children with Binet I. Q. 's 70 to 79. Again all of the differences are negative, again in favor of the regular class pupils, and again all of the critical ratios are highly significant except the

differences in scores shown in Table 40. The children in the I. Q. range of 70 to 79 who are placed in special education are not doing as good academic work as the children in the regular classes.

The three separate comparisons for the three intelligence quotient ranges have not shown any instances in which the special education classes were achieving significantly better than children in the regular classes. On the contrary, as a matter of fact, practically every measure shows that the children in the regular classes were achieving more academically than the children in the special classes. One further comparison needs to be made; it is possible that special education may be relatively more effective with some age groups than with others. We have made a comparison for three age groups and each of these will be reported.

Tables 43, 44, and 45 show the comparison on all of the achievement test measures for children aged 6 to 10 in special classes and in regular classes. All of these children are in the intelligence quotient range of 50 through 79. These tables indicate by the negative differences in the next to the last column of each table that in every measure the children in regular classes show an advantage over children in the special classes. Almost all of the critical ratios show that these differences are highly significant, the only exception being, as has frequently been the case before, the arithmetic computation measures.

Tables 46, 47, and 48 show the results for children in the age range 11 to 13 years, the largest group in the study. All but two of these measures, and these are again for arithmetic computation, show that the children in the regular classes are achieving more than the children in the special classes. The critical ratios in these tables are not quite so high as they have been in some of the previous tables, but the direction of the difference is consistently significant.

Tables 49, 50, and 51 give a comparison for the mentally handicapped children of ages 14 through 16 years in special classes and in regular classes. Again

every difference is in favor of the regular class group, though the differences do not show as high a test of statistical significance as for the younger children.

There seems to be some basis for concluding that special education is somewhat more effective relatively with the older children than it is with the younger children. This conclusion must be made very cautiously because the differences are so small that they are not very significant. The reasons for the differences which have been cited in this section of the report will need to be studied very carefully for their explanation and for their educational significance.

DESCRIPTION OF THE EXPERIMENTAL GROUP

First Achievement Testing

Table 1

Summary

Total:	1273			
Race:	White	Negro		
	912	361		
Sex:	Male	Female		
	797	476		
Race & Sex:	White Male	White Female	Negro Male	Negro Female
	573	339	224	137
Age	6-10	11-13	14-16	No Record
	394	586	290	3

Table 2

Age Distributions

Age	White Male	White Female	Negro Male	Negro Female
6-10	156	109	78	51
11-13	250	152	117	67
14-16	165	77	29	19
No Record	2	1		

	White	Negro	Male	Female
6-10	265	129	234	160
11-13	402	184	367	219
14-16	242	48	194	96
No Record	3		2	1

DESCRIPTION OF THE EXPERIMENTAL GROUP

First Achievement Testing

Table 3

Distribution of Intelligence Quotients

I. Q.	White Male	White Female	Negro Male	Negro Female	White	Negro	Male	Female	Total
50	8	6	1		14	1	9	6	15
51	10	4		3	14	3	10	7	17
52	9	7	1	4	16	5	10	11	21
53	11	9	5	4	20	9	16	13	29
54	16	8	5	3	24	8	21	11	32
55	12	6	3	1	18	4	15	7	22
56	9	13	3	2	22	5	12	15	27
57	9	10	7	5	19	12	16	15	31
58	19	13	7	5	32	12	26	18	44
59	13	9	9	9	22	18	22	18	40
60	19	17	10	2	36	12	29	19	48
61	18	13	7	2	31	9	25	15	40
62	15	9	7	2	24	9	22	11	33
63	22	17	13	5	39	18	35	22	57
64	16	9	11	8	25	19	27	17	44
65	25	17	10	5	42	15	35	22	57
66	18	18	15	5	36	20	33	23	56
67	20	12	8	9	32	17	28	21	49
68	24	15	14	7	39	21	38	22	60
69	28	17	7	4	45	11	35	21	56
70	30	15	10	6	45	16	40	21	61
71	36	14	12	7	50	19	48	21	69
72	26	16	12	3	42	15	38	19	57
73	31	14	13	9	45	22	44	23	67
74	30	12	9	8	42	17	39	20	59
75	29	11	7	3	40	10	36	14	50
76	18	6	6	3	24	9	24	9	33
77	13	8	5	3	21	8	18	11	29
78	13	4	2	8	17	10	15	12	27
79	22	9	4	2	31	6	26	11	37
No Record	4	1	1		5	1	5	1	6
Total	573	339	224	137	912	361	797	476	1273
Mean	66.79	65.19	66.23	66.12	66.19	66.19	66.63	65.46	66.19

DESCRIPTION OF THE EXPERIMENTAL GROUP

First Achievement Testing

Table 4

Distribution of Sex, Race, Age, and I. Q. for Special Classes and Regular Classes

	Special Classes*		Regular Classes**		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Male	477	62.03	320	63.49	797	62.61
Female	292	37.97	184	36.51	476	37.39
White	588	76.46	324	64.29	912	71.64
Negro	181	23.54	180	35.71	361	28.36
50-59 I. Q.	221	28.74	57	11.31	278	21.84
60-69 I. Q.	308	40.05	192	38.10	500	39.28
70-79 I. Q.	237	30.82	252	50.00	489	38.41
No Record	3	.39	3	.60	6	.47
6-10 Years	201	26.14	193	38.29	394	30.95
11-13 Years	369	47.98	217	43.06	586	46.03
14-16 Years	197	25.62	93	18.45	290	22.78
No Record	2	.26	1	.20	3	.24
Total	769		504		1273	

* Special Classes consist of children who have had more than three months in special education.

** Regular Classes consist of children who have never been in special education or have had only one, two or three months.

DESCRIPTION OF THE EXPERIMENTAL GROUP

First Achievement Testing

Table 5

School Placement and Age (Detail)

Age	Special Classes		Regular Classes		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
6,0 - 6,11	1	0.13	2	0.40	3	0.24
7,0 - 7,11	6	0.78	19	3.78	25	1.97
8,0 - 8,11	34	4.43	50	9.94	84	6.61
9,0 - 9,11	59	7.69	56	11.13	115	9.06
10,0 - 10,11	101	13.17	66	13.12	167	13.15
11,0 - 11,11	121	15.78	62	12.33	183	14.41
12,0 - 12,11	127	16.56	72	14.31	199	15.67
13,0 - 13,11	121	15.78	83	16.50	204	16.06
14,0 - 14,11	118	15.38	52	10.34	170	13.39
15,0 - 15,11	75	9.78	40	7.95	115	9.06
16,0 - 16,11	4	0.52	1	0.20	5	.39
Total	767	100.00	503	100.00	1270	100.00
Mean (Years)	12.40		11.79		12.16	

DESCRIPTION OF THE EXPERIMENTAL GROUP

First Achievement Testing

Table 6

Months in Special Education

Months in Sp. Ed.	White Male	White Female	Negro Male	Negro Female	Total White	Total Negro	Total Male	Total Female	Total
0	142	66	78	59	208	137	220	125	345
1-3	66	50	34	9	116	43	100	59	159
4-6	61	37	6	6	98	12	67	43	110
7-9	41	23	19	15	64	34	60	38	98
10-12	50	26	11	8	76	19	61	34	95
13-15	42	38	10	7	80	17	52	45	97
16-18	21	10	18	3	31	21	39	13	52
19-21	24	13	15	8	37	23	38	21	60
22-24	28	21			49		28	21	49
25-27	6	5	13	10	11	23	19	15	34
28-30	13	6	5	1	19	6	18	7	25
31-33	29	18			47		29	18	47
34-36	7	2	4	6	9	10	11	8	19
37-39	11	4	3	3	15	6	14	7	21
40-42	8	8			16		8	8	16
43-45	1	3	7	1	4	8	8	4	12
Over 46	23	9	1	1	32	2	24	10	34
Total	573	339	224	137	912	361	797	476	1273
Mean	12.42	12.45	9.88	9.17	12.43	9.61	11.71	11.51	11.63

SCHOOL ACHIEVEMENT AND SEX

First Achievement Testing
Comparison of Boys and Girls
Group 1 - Boys   Group 2 - Girls

Table 7

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	788	471	2.02	2.33	1.07	1.15	-.31	4.70
Word Meaning	788	473	2.11	2.42	1.07	1.14	-.31	4.77
Spelling	793	473	2.17	2.68	1.26	1.42	-.51	6.46
Arithmetic Reasoning	794	475	2.28	2.31	1.14	1.17	-.03	.45
Arithmetic Computation	794	475	2.75	2.66	1.24	1.26	.09	1.25
Battery Median	795	475	2.17	2.41	1.07	1.15	-.24	3.69

Table 8

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	771	457	-1.04	-.39	1.23	1.00	-.65	10.00
Word Meaning	771	459	- .93	-.32	1.25	.99	-.61	9.53
Spelling	776	458	- .88	-.04	1.34	1.20	-.84	11.51
Arithmetic Reasoning	777	461	- .77	-.42	.99	.86	-.35	6.68
Arithmetic Computation	770	462	- .26	-.03	.98	.93	-.23	4.11
Battery Median	778	460	- .86	-.29	1.10	.89	-.57	10.00

Table 9

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	734	440	.65	.84	.38	.40	-.19	7.92
Word Meaning	734	442	.70	.88	.39	.41	-.18	7.50
Spelling	739	442	.70	.97	.44	.48	-.27	9.64
Arithmetic Reasoning	741	444	.72	.81	.31	.32	-.09	5.29
Arithmetic Computation	741	445	.91	.99	.35	.40	-.08	3.33
Battery Median	739	443	.71	.88	.35	.36	-.17	7.73

SCHOOL ACHIEVEMENT AND RACE

First Achievement Testing
Comparison of White and Negro Pupils
Group 1 - White Pupils   Group 2 - Negro Pupils

Table 10

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	898	361	2.13	2.14	1.11	1.11	-.01	.14
Word Meaning	900	361	2.22	2.22	1.13	1.05	.00	.00
Spelling	905	361	2.36	2.35	1.35	1.33	.01	.12
Arithmetic Reasoning	908	361	2.31	2.22	1.17	1.10	.09	1.29
Arithmetic Computation	908	361	2.81	2.47	1.27	1.17	.34	4.53
Battery Median	909	361	2.27	2.24	1.12	1.06	.03	.45

Table 11

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	869	359	-.91	-.53	1.18	1.10	-.38	5.35
Word Meaning	871	359	-.80	-.45	1.22	1.05	-.35	5.07
Spelling	875	359	-.66	-.34	1.34	1.32	-.32	3.81
Arithmetic Reasoning	879	359	-.72	-.44	.98	.86	-.28	4.91
Arithmetic Computation	881	359	-.18	-.16	1.00	.86	-.02	.35
Battery Median	879	359	-.75	-.42	1.10	.96	-.33	5.24

Table 12

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	839	335	.70	.79	.38	.43	-.09	3.21
Word Meaning	841	335	.74	.84	.39	.44	-.10	3.57
Spelling	845	335	.77	.87	.46	.54	-.10	3.03
Arithmetic Reasoning	850	335	.74	.81	.32	.32	-.07	3.50
Arithmetic Computation	851	335	.95	.93	.39	.34	.02	.91
Battery Median	847	335	.75	.83	.35	.38	-.08	3.64

SCHOOL ACHIEVEMENT AND INTELLIGENCE LEVEL

First Achievement Testing

Comparison of Three I.Q. (Binet) Groups
Group 1 - I.Q. 50-59   Group 2 - I.Q. 60-69   Group 3 - I.Q. 70-79

Table 13

Scores on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	277	490	486	1.77	2.19	2.30	.95	1.05	1.19	.42	.53	.11	5.60	6.71	1.53
Word Meaning	278	492	485	1.86	2.28	2.38	1.01	1.07	1.17	.42	.52	.10	5.45	6.42	1.41
Spelling	278	497	485	1.98	2.42	2.52	1.18	1.34	1.38	.44	.54	.10	4.73	5.74	1.15
Arithmetic Reasoning	277	499	487	1.83	2.28	2.56	.97	1.04	1.26	.45	.73	.28	6.00	8.90	3.78
Arithmetic Computation	278	499	486	2.20	2.76	2.97	1.04	1.20	1.33	.56	.77	.21	6.83	8.85	2.59
Battery Median	278	499	487	1.86	2.31	2.45	.95	1.05	1.16	.45	.59	.14	6.16	7.66	1.97

Table 14

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	266	481	478	-.34	-.71	-1.14	1.04	1.06	1.26	-.37	- .80	-.43	4.63	9.30	5.73
Word Meaning	267	483	477	-.27	-.58	-1.07	.95	1.08	1.29	-.31	- .80	-.49	4.08	9.64	6.36
Spelling	267	487	477	-.14	-.45	-1.43	1.20	1.28	1.38	-.31	-1.29	-.98	3.30	13.30	11.40
Arithmetic Reasoning	266	490	479	-.28	-.59	- .90	.88	.88	1.01	-.31	- .62	-.31	4.63	8.73	5.08
Arithmetic Computation	267	491	479	.19	-.10	- .45	.83	.93	.97	-.29	- .64	-.35	4.39	9.41	5.65
Battery Median	267	489	479	-.23	-.55	- .98	.90	.97	1.13	-.32	- .75	-.43	4.57	10.00	6.32

SCHOOL ACHIEVEMENT AND INTELLIGENCE LEVEL

First Achievement Testing
Comparison of Three I.Q. (Binet) Groups
Group 1 - I.Q. 50-59 Group 2 - I.Q. 60-69 Group 3 - I.Q. 70-79

Table 15

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	251	457	464	.80	.75	.66	.46	.39	.34	-.05	-.14	-.09	1.52	4.38	4.09
Word Meaning	252	459	463	.84	.80	.70	.46	.40	.37	-.04	-.14	-.10	1.21	4.24	4.17
Spelling	252	463	464	.89	.83	.72	.54	.48	.41	-.06	-.17	-.11	1.46	4.25	3.67
Arithmetic Reasoning	252	465	466	.82	.77	.71	.40	.31	.27	-.05	-.11	-.06	1.79	3.93	3.00
Arithmetic Computation	252	466	466	1.04	.96	.87	.43	.37	.32	-.08	-.17	-.09	2.50	5.67	4.09
Battery Median	252	464	464	.85	.80	.71	.43	.35	.31	-.05	-.14	-.09	1.56	4.67	4.09

SCHOOL ACHIEVEMENT AND AGE LEVEL

First Achievement Testing
Comparison of Three Age Groups

Group 1 - Age 6 - 10 Years   Group 2 - Age 11-13 Years   Group 3 - Age 14 - 16 Years

Table 16

Scores on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	390	582	287	1.50	2.24	2.78	.77	1.00	1.26	.74	1.28	.54	12.98	15.24	6.35
Word Meaning	390	583	288	1.60	2.34	2.82	.79	1.01	1.27	.74	1.22	.48	12.98	14.35	5.65
Spelling	392	584	290	1.63	2.48	3.11	.96	1.26	1.45	.85	1.48	.63	11.97	15.10	6.30
Arithmetic Reasoning	393	586	290	1.46	2.42	3.14	.68	1.02	1.18	.96	1.68	.72	17.45	21.82	8.89
Arithmetic Computation	394	586	289	1.80	2.86	3.68	.83	1.07	1.24	1.06	1.88	.82	17.38	22.38	9.65
Battery Median	394	586	290	1.53	2.40	2.98	.76	.97	1.18	.87	1.45	.58	15.54	18.35	7.25

Table 17

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	361	581	286	-.23	-.87	-1.39	.91	1.08	1.38	-.64	-1.16	-.52	9.70	12.21	5.59
Word Meaning	361	582	287	-.11	-.75	-1.34	.91	1.05	1.39	-.64	-1.23	-.59	9.85	12.95	6.34
Spelling	362	583	289	-.09	-.62	-1.06	1.07	1.27	1.57	-.53	- .97	-.44	6.88	8.98	4.15
Arithmetic Reasoning	364	585	289	-.29	-.67	-1.02	.72	.89	1.19	-.38	- .73	-.35	7.17	9.24	4.43
Arithmetic Computation	367	585	288	.14	-.22	- .47	.75	.92	1.15	-.36	- .61	-.25	6.67	7.82	3.25
Battery Median	364	585	289	-.18	-.68	-1.18	.85	.94	1.29	-.50	-1.00	-.50	8.47	11.36	5.88

SCHOOL ACHIEVEMENT AND AGE LEVEL

First Achievement Testing
Comparison of Three Age Groups
Group 1 - Age 6 - 10 Years Group 2 - Age 11 - 13 Years Group 3 - Age 14 - 16 Years

Table 18

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	310	578	286	.83	.71	.64	.50	.35	.32	-.12	-.19	-.07	3.75	5.43	2.92
Word Meaning	311	577	287	.91	.70	.66	.52	.41	.32	-.21	-.25	-.04	6.00	6.94	1.54
Spelling	312	581	289	.90	.79	.73	.58	.44	.39	-.11	-.17	-.06	2.97	4.25	2.14
Arithmetic Reasoning	315	581	289	.79	.75	.73	.38	.29	.29	-.04	-.06	-.02	1.67	2.14	1.00
Arithmetic Computation	316	582	288	1.04	.92	.87	.48	.33	.29	-.12	-.17	-.05	4.00	5.31	2.27
Battery Median	312	581	289	.86	.76	.70	.45	.32	.30	-.10	-.16	-.06	3.57	5.33	2.73

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Total Groups
Group 1 - Special Classes Group 2 - Regular Classes

Table 19

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	760	499	1.97	2.38	1.04	1.17	-.41	6.41
Word Meaning	762	499	2.09	2.42	1.06	1.16	-.33	5.08
Spelling	764	502	2.20	2.61	1.23	1.45	-.41	5.19
Arithmetic Reasoning	767	502	2.16	2.47	1.06	1.26	-.31	4.49
Arithmetic Computation	766	503	2.66	2.78	1.19	1.35	-.12	1.64
Battery Median	767	503	2.14	2.46	1.04	1.16	-.32	5.00

Table 20

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	743	485	-.95	-.56	1.12	1.23	-.39	5.65
Word Meaning	745	485	-.81	-.53	1.16	1.22	-.28	4.00
Spelling	746	488	-.72	-.35	1.30	1.39	-.37	4.68
Arithmetic Reasoning	750	488	-.74	-.49	.97	.94	-.25	4.46
Arithmetic Computation	750	490	-.18	-.15	.96	.95	-.03	.55
Battery Median	749	489	-.76	-.48	1.05	1.09	-.28	4.52

Table 21

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	723	451	.66	.82	.37	.42	-.16	6.67
Word Meaning	725	451	.72	.84	.38	.43	-.12	5.00
Spelling	726	455	.75	.89	.44	.51	-.14	4.67
Arithmetic Reasoning	729	456	.72	.82	.32	.32	-.10	5.88
Arithmetic Computation	728	458	.93	.95	.38	.36	-.02	.91
Battery Median	728	454	.73	.84	.35	.37	-.11	5.00

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Boys
Group 1 - Special Classes Group 2 - Regular Classes

Table 22

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	471	317	1.89	2.21	1.01	1.12	-.32	4.10
Word Meaning	471	317	2.00	2.26	1.02	1.13	-.26	3.29
Spelling	473	320	2.05	2.36	1.17	1.34	-.31	3.35
Arithmetic Reasoning	475	319	2.20	2.38	1.07	1.23	-.18	2.13
Arithmetic Computation	474	320	2.73	2.77	1.20	1.31	-.11	1.20
Battery Median	475	320	2.08	2.31	1.02	1.11	-.23	2.96

Table 23

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	463	308	-1.21	-.79	1.15	1.29	-.42	4.63
Word Meaning	463	308	-1.05	-.74	1.18	1.28	-.31	3.40
Spelling	465	311	-1.03	-.64	1.31	1.35	-.39	3.99
Arithmetic Reasoning	467	310	-.86	-.63	1.49	.94	-.23	2.64
Arithmetic Computation	466	312	-.29	-.22	1.02	.95	-.07	.98
Battery Median	467	311	-.98	-.68	1.07	1.10	-.30	3.77

Table 24

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	448	286	.60	.75	.33	.43	-.15	5.03
Word Meaning	448	286	.65	.78	.35	.44	-.13	4.22
Spelling	450	289	.65	.79	.40	.49	-.14	4.19
Arithmetic Reasoning	452	289	.69	.78	.30	.32	-.09	3.83
Arithmetic Computation	451	290	.90	.93	.36	.34	-.03	1.15
Battery Median	451	288	.67	.78	.31	.37	-.11	4.18

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Girls
Group 1 - Special Classes   Group 2 - Regular Classes

Table 25

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	289	182	2.11	2.69	1.07	1.18	-.58	5.37
Word Meaning	291	182	2.24	2.71	1.10	1.13	-.47	4.43
Spelling	291	182	2.44	3.06	1.30	1.54	-.62	4.53
Arithmetic Reasoning	292	183	2.11	2.62	1.05	1.28	-.51	4.51
Arithmetic Computation	292	183	2.56	2.82	1.16	1.40	-.26	2.10
Battery Median	292	183	2.22	2.72	1.08	1.18	-.50	4.63

Table 26

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	280	177	-.53	-.17	.93	1.03	-.36	3.78
Word Meaning	282	177	-.41	-.17	.94	1.00	-.24	2.56
Spelling	281	177	-.18	.18	1.12	1.25	-.36	3.13
Arithmetic Reasoning	283	178	-.52	-.25	.81	.88	-.27	3.30
Arithmetic Computation	284	178	.02	-.04	.89	.95	.06	.68
Battery Median	282	178	-.39	-.14	.85	.95	-.25	2.86

Table 27

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	275	165	.78	.94	.40	.37	-.16	4.26
Word Meaning	277	165	.84	.96	.41	.39	-.12	3.07
Spelling	276	166	.91	1.06	.47	.49	-.15	3.16
Arithmetic Reasoning	277	167	.76	.89	.33	.30	-.13	4.25
Arithmetic Computation	277	168	.99	.98	.41	.39	.01	.26
Battery Median	277	166	.83	.95	.37	.34	-.12	3.48

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
White
Group 1 - Special Classes Group 2 - Regular Classes

Table 28

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	579	319	2.01	2.34	1.06	1.17	-.33	4.18
Word Meaning	581	319	2.12	2.40	1.08	1.20	-.28	3.47
Spelling	583	322	2.25	2.58	1.26	1.47	-.33	3.43
Arithmetic Reasoning	586	322	2.21	2.50	1.09	1.28	-.29	3.44
Arithmetic Computation	585	323	2.77	2.89	1.21	1.36	-.12	1.32
Battery Median	586	323	2.17	2.45	1.07	1.19	-.28	3.52

Table 29

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	563	306	-1.00	-.74	1.15	1.28	-.26	2.96
Word Meaning	565	306	-.86	-.69	1.18	1.29	-.17	1.91
Spelling	566	309	-.74	-.52	1.31	1.38	-.22	2.29
Arithmetic Reasoning	570	309	-.78	-.61	.98	.97	-.17	2.47
Arithmetic Computation	570	311	-.17	-.18	.99	1.00	.01	.14
Battery Median	569	310	-.81	-.63	1.07	1.13	-.18	2.30

Table 30

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	549	290	.66	.76	.36	.40	-.10	3.53
Word Meaning	551	290	.71	.78	.38	.41	-.07	2.41
Spelling	552	294	.75	.82	.44	.45	-.07	2.18
Arithmetic Reasoning	555	295	.71	.78	.31	.32	-.07	3.08
Arithmetic Computation	554	297	.94	.95	.40	.37	-.01	.37
Battery Median	554	293	.73	.80	.34	.36	-.07	2.77

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Negroes
Group 1 - Special Classes Group 2 - Regular Classes

Table 31

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	181	180	1.84	2.46	.96	1.16	-.62	5.54
Word Meaning	181	180	1.99	2.46	.98	1.05	-.47	4.39
Spelling	181	180	2.03	2.66	1.15	1.43	-.63	4.60
Arithmetic Reasoning	181	180	2.02	2.44	.95	1.20	-.42	3.68
Arithmetic Computation	181	180	2.34	2.60	1.02	1.29	-.26	2.13
Battery Median	181	180	2.00	2.47	.97	1.09	-.47	4.31

Table 32

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	180	179	-.81	-.26	1.06	1.08	-.55	4.87
Word Meaning	180	179	-.64	-.26	1.00	1.07	-.38	3.48
Spelling	180	179	-.63	-.05	1.24	1.31	-.58	4.30
Arithmetic Reasoning	180	179	-.59	-.29	.86	.85	-.30	3.33
Arithmetic Computation	180	179	-.21	-.10	.83	.84	-.11	1.25
Battery Median	180	179	-.60	-.23	.89	.97	-.37	3.76

Table 33

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	174	161	.68	.92	.40	.42	-.24	5.37
Word Meaning	174	161	.74	.95	.40	.45	-.21	4.51
Spelling	174	161	.76	1.00	.47	.58	-.24	4.15
Arithmetic Reasoning	174	161	.74	.88	.32	.31	-.14	4.09
Arithmetic Computation	174	161	.91	.95	.33	.34	-.04	1.09
Battery Median	174	161	.75	.93	.35	.39	-.18	4.47

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
I.Q. 50-59
Group 1 - Special Classes   Group 2 - Regular Classes

Table 34

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	220	57	1.66	2.18	.92	.93	-.52	3.77
Word Meaning	221	57	1.76	2.23	1.02	.88	-.47	3.48
Spelling	221	57	1.86	2.41	1.12	1.29	-.55	2.94
Arithmetic Reasoning	221	56	1.75	2.13	.98	.92	-.38	2.73
Arithmetic Computation	221	57	2.20	2.26	1.06	.95	-.06	.41
Battery Median	221	57	1.76	2.26	.94	.88	-.50	3.76

Table 35

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	211	55	-.48	.19	1.01	1.02	-.67	4.35
Word Meaning	212	55	-.39	.21	.93	.93	-.60	4.26
Spelling	212	55	-.28	.39	1.15	1.29	-.67	3.51
Arithmetic Reasoning	212	54	-.38	.10	.88	.82	-.48	3.78
Arithmetic Computation	212	55	.17	.28	.85	.85	-.11	.86
Battery Median	212	55	-.34	.24	.87	.89	-.58	4.33

Table 36

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	203	48	.74	1.02	.45	.47	-.28	3.74
Word Meaning	204	48	.79	1.07	.44	.46	-.28	3.83
Spelling	204	48	.83	1.14	.52	.57	-.31	3.44
Arithmetic Reasoning	204	48	.77	.99	.40	.33	-.22	3.98
Arithmetic Computation	204	48	1.03	1.07	.44	.42	-.04	.59
Battery Median	204	48	.80	1.06	.42	.40	-.26	4.01

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
I.Q. 60-69
Group 1 - Special Classes   Group 2 - Regular Classes

Table 37

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	301	189	2.11	2.32	1.02	1.09	-.21	2.13
Word Meaning	303	189	2.24	2.36	1.02	1.12	-.12	1.20
Spelling	305	192	2.33	2.56	1.28	1.41	-.23	1.84
Arithmetic Reasoning	307	192	2.26	2.30	1.00	1.09	-.04	.41
Arithmetic Computation	307	192	2.82	2.66	1.17	1.24	.16	1.42
Battery Median	307	192	2.26	2.38	1.02	1.09	-.12	1.23

Table 38

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	298	183	-.86	-.46	.99	1.16	-.40	3.88
Word Meaning	300	183	-.69	-.39	1.01	1.15	-.30	2.91
Spelling	301	186	-.60	-.19	1.26	1.26	-.41	3.47
Arithmetic Reasoning	304	186	-.66	-.47	.88	.87	-.19	2.36
Arithmetic Computation	304	187	-.10	-.10	.95	.89	.00	.00
Battery Median	303	186	-.67	-.36	.93	.99	-.31	3.44

Table 39

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	290	167	.70	.84	.35	.45	-.14	3.47
Word Meaning	292	167	.76	.87	.36	.45	-.11	2.70
Spelling	293	170	.78	.93	.44	.53	-.15	3.12
Arithmetic Reasoning	295	170	.74	.83	.28	.34	-.09	2.92
Arithmetic Computation	295	171	.96	.96	.38	.35	.00	.00
Battery Median	294	170	.76	.86	.32	.39	-.10	2.83

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
I.Q. 70-79
Group 1 Special Classes   Group 2 - Regular Classes

Table 40

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	236	250	2.07	2.50	1.09	1.26	-.43	4.02
Word Meaning	235	250	2.23	2.52	1.11	1.22	-.29	2.74
Spelling	235	250	2.36	2.69	1.21	1.51	-.33	2.66
Arithmetic Reasoning	236	251	2.44	2.68	1.11	1.39	-.24	2.11
Arithmetic Computation	235	251	2.93	3.01	1.18	1.45	-.08	.67
Battery Median	236	251	2.33	2.57	1.08	1.23	-.24	2.31

Table 41

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	233	245	-1.51	-.80	1.19	1.26	-.71	6.34
Word Meaning	232	245	-1.36	-.80	1.28	1.23	-.56	4.87
Spelling	232	245	-1.24	-.63	1.32	1.39	-.61	4.92
Arithmetic Reasoning	233	246	-1.17	-.64	.97	.99	-.53	5.92
Arithmetic Computation	233	246	-.61	-.29	.94	.99	-.32	3.63
Battery Median	233	246	-1.26	-.73	1.09	1.11	-.53	5.25

Table 42

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	230	234	.56	.76	.30	.36	-.20	6.51
Word Meaning	229	234	.61	.78	.32	.39	-.17	5.14
Spelling	229	235	.64	.80	.35	.45	-.16	4.28
Arithmetic Reasoning	230	236	.64	.77	.24	.28	-.13	5.28
Arithmetic Computation	229	237	.82	.92	.29	.34	-.10	3.42
Battery Median	230	234	.64	.78	.27	.33	-.14	5.00

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 6 - 10 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 43

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	198	192	1.31	1.71	.66	.82	-.40	5.30
Word Meaning	198	192	1.46	1.75	.74	.81	-.29	3.69
Spelling	200	192	1.52	1.75	.86	1.04	-.23	2.38
Arithimetic Reasoning	201	192	1.39	1.55	.60	.74	-.16	2.38
Arithmetic Computation	201	193	1.78	1.81	.84	.82	-.03	.36
Battery Median	201	193	1.42	1.66	.69	.80	-.24	3.18

Table 44

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	183	178	-.51	.07	.81	.91	-.58	6.37
Word Meaning	183	178	-.33	.11	.86	.91	-.44	4.73
Spelling	184	178	-.26	.10	.98	1.13	-.36	3.24
Arithmetic Reasoning	186	178	-.43	-.14	.70	.72	-.29	3.92
Arithmetic Computation	187	180	.08	.20	.83	.67	-.12	1.52
Battery Median	185	179	-.37	.02	.81	.82	-.39	4.59

Table 45

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	165	145	.71	.98	.45	.52	-.27	4.88
Word Meaning	166	145	.81	1.03	.48	.54	-.22	3.75
Spelling	166	146	.81	1.00	.50	.65	-.19	2.86
Arithmetic Reasoning	168	147	.72	.87	.35	.39	-.15	3.57
Arithmetic Computation	167	149	1.00	1.07	.51	.43	-.07	1.32
Battery Median	167	145	.78	.96	.42	.47	-.18	3.56

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 11 - 13 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 46

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	367	215	2.02	2.62	.94	.99	-.60	7.19
Word Meaning	368	215	2.18	2.64	.98	.96	-.46	5.56
Spelling	367	217	2.23	2.91	1.18	1.27	-.68	6.42
Arithmetic Reasoning	369	217	2.22	2.76	.96	1.01	-.54	6.37
Arithmetic Computation	369	217	2.74	3.07	1.06	1.04	-.33	3.68
Battery Median	369	217	2.20	2.74	.95	.90	-.54	6.87

Table 47

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	366	215	-.92	-.79	1.08	1.13	-.13	1.37
Word Meaning	367	215	-.74	-.78	1.01	1.11	.04	.43
Spelling	366	217	-.70	-.47	1.26	1.27	-.23	2.48
Arithmetic Reasoning	368	217	-.69	-.64	.88	.93	-.05	.64
Arithmetic Computation	366	217	-.15	-.33	.88	.97	.18	2.25
Battery Median	368	217	-.70	-.64	.90	.97	-.06	.74

Table 48

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	364	214	.67	.76	.36	.34	-.09	3.02
Word Meaning	364	214	.73	.77	.35	.33	-.04	1.37
Spelling	364	216	.74	.85	.45	.41	-.11	3.03
Arithmetic Reasoning	365	216	.73	.79	.31	.27	-.06	2.46
Arithmetic Computation	366	215	.94	.89	.34	.32	.05	1.79
Battery Median	365	215	.74	.80	.32	.30	-.06	2.26

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

First Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 14 - 16 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 49

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	195	92	2.55	3.27	1.14	1.35	-.72	4.42
Word Meaning	196	92	2.58	3.32	1.15	1.35	-.74	4.54
Spelling	197	93	2.84	3.68	1.29	1.60	-.84	4.42
Arithmetic Reasoning	197	93	2.86	3.71	1.08	1.22	-.85	5.74
Arithmetic Computation	196	93	3.45	4.18	1.13	1.33	-.73	4.56
Battery Median	197	93	2.75	3.47	1.09	1.19	-.72	4.93

Table 50

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	194	92	-1.44	-1.27	1.33	1.45	-.17	.93
Word Meaning	195	92	-1.40	-1.20	1.37	1.43	-.20	1.12
Spelling	196	93	-1.14	- .89	1.49	1.74	-.25	1.20
Arithmetic Reasoning	196	93	-1.11	- .84	1.18	1.18	-.27	1.81
Arithmetic Computation	195	93	- .50	- .41	1.12	1.18	-.09	.62
Battery Median	196	93	-1.24	-1.06	1.26	1.32	-.18	1.10

Table 51

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	194	92	.61	.70	.31	.32	-.09	2.22
Word Meaning	195	92	.63	.71	.32	.32	-.08	1.97
Spelling	196	93	.71	.79	.38	.41	-.08	1.59
Arithmetic Reasoning	196	93	.69	.80	.30	.27	-.11	3.14
Arithmetic Computation	195	93	.86	.89	.30	.27	-.03	.85
Battery Median	196	93	.67	.75	.30	.30	-.08	2.11

SECTION III

ACADEMIC ACHIEVEMENT OF MENTALLY RETARDED CHILDREN

SECOND ACHIEVEMENT TESTING

During the school year of 1958-59 most of the children who had been tested earlier were retested, using the appropriate level of the Stanford Achievement Test. The interval between the first and second testing varied somewhat because of several circumstances. Many children were admitted to the special classes after our first testing, and as a result of this some of the children in each group had been in special education a shorter time than other children. It was our intention to make the interval one school year, but this was not always possible. On account of the distances necessary to travel to obtain the data, it was necessary to start the retesting fairly early in the school year. If we could have postponed all of the second testing until the last two months of the year the interval between the two testings would have been somewhat longer, but it was not possible to do this and complete a second testing for a significantly large group of children.

The total group which was retested numbered 765 pupils. Tables 1 through 6 of this section show the distribution of the significant variables descriptive of the group. Table 1 shows that the ratio of boys to girls was about the same as in the first testing and that the ratio of White children to Negro children was about the same as earlier. We were able to secure a somewhat higher percentage of the Negro children for retesting, partly because many of them were in Wake County which was fairly accessible to the location of the University.

Tables 2 and 4 show higher ages, of course, at the time of the second testing. There is no significant change, however, in this difference in any of the subgroups.

Table 3 reports the distribution of intelligence quotients for all of the children who were retested. The distribution is very similar to that of the first testing, and the mean I. Q. 's show very little variation from the first testing.

The difference in the months which the children had spent in special education is considerably different from the first testing. A comparison of Table 6 of this section with Table 6 of the previous section shows that on the average the children who were in special education had been in these classes for about seven months between the first and the second testing period. The difference was not quite so large for the Negro children. This is partly due to the fact that the classes for the Negro children were established somewhat later. Some of our classes for Negro children were fairly new classes at the time of the first testing.

The same comparisons of groups of boys and girls, White and Negro pupils, children of different I. Q. levels, and children of three different ages have been compared as they were in the previous report. An examination of Tables 7, 8, and 9 shows again that the girls whom we studied were doing significantly better work academically as measured by the Stanford Achievement Test. They had higher average scores, smaller deviations from expectancy, and higher ratios of achievement to expectancy on the Stanford Achievement Test. Some of the same observations which were made in the previous section of the report are to be made from these tables again. Spelling is again the most variable test. Again arithmetic computation is the field in which the girls are less significantly superior to the boys and the one in which the deviations of all children are lower than for the other school subjects. The critical ratio column at the right of each table shows that with the exception of the arithmetic test, the differences between boys and girls are significant at a high level.

Tables 10, 11, and 12 present a comparison of the performance of White children and of Negro children. The absolute scores on each section of the Stanford Achievement Test are higher for the White children than for the Negro children, but the critical ratios show that these differences are not highly significant statistically. If we examine closely the table of deviations from expectancy and the table of Ratios of Achievement to Expectancy we see that there is a slight difference in favor of the performance of the Negro children. These differences, again, are not highly significant statistically. The fact that they are rather consistently in one direction seems to indicate that there is a slight tendency for the Negro children to come somewhat closer to expectancy than the White children.

Tables 13, 14, and 15 present a comparison of the results of a second achievement testing as it is affected by the Binet I. Q. of the children in the group.

Table 13 which presents the averages of the scores for three groups; 50 to 59 I. Q., 60 to 69 I. Q., and 70 to 79 I. Q., shows that the relatively brighter children have somewhat higher school achievement than those in the lower groups, and all of the columns of critical ratios show that these differences are statistically significant. The story is somewhat different if we examine the table of Deviations from Expectancy (Table 14). It is somewhat disconcerting to note that the first group, in the I. Q. range 50 to 59 show less negative deviation than those in the second group with I. Q. 's from 60 to 69 and that these are again less serious than the deviations for the children in the third group, those with intelligence quotients from 70 to 79. All of the difference columns show a negative value for each difference, and all of the critical ratios columns show that these differences are significant. We cannot fail to accept it as a fact that in the range which is referred to as the mentally handicapped child in school the brighter the children the farther they are from achieving in academic subjects at the level which we might predict them to be capable of doing.

The results of studying the ratios of achievement to expectancy as summarized in Table 15 also show a difference in favor of the dullest group with the highest of our three groups showing the lowest ratio. Though these differences are not as significant statistically as those in Table 14, the consistency of the direction of the trend must be accepted as supporting the conclusion in the previous paragraph that the mentally handicapped children in our schools who are relatively brighter than other children in their classes are doing relatively less well in academic work.

Tables 16, 17, and 18 present a three-way comparison of the academic achievement at the time of the second testing for three age groups: Group 1, 6 to 10 years; Group 2, age 11 to 13 years; and Group 3, age 14 to 16 years. Table 16 shows the average scores on the Stanford Achievement Test for the three age groups. As is to be expected, the older children are achieving more in absolute grade placement as measured by the test than the younger children, and these differences are very highly significant. This table seems to justify us in concluding that the children of the intelligence levels studied continue to achieve in school up to the age of 16 years. Some educational directors of residential institutions for mentally handicapped children believe that the educational gains continue beyond the age level which we have studied, but we have kept within the age range in which we found a significant number of children in the public schools.

The examination of Table 17 shows that Group 1, the youngest children, have lower average deviations in Deviations from Expectancy in all school subjects than does Group 2, children of ages 11 to 13 years, and that this group again is on the average achieving more nearly in proportion to their ability than Group 3, children of ages 11 to 13 years. Most of the critical ratios are again very highly significant, and the consistency of the direction of the trend seems to force the conclusion that although the older children are still gaining in school achievement, they do not continue to gain in proportion to their ability. The most serious let-down seems to come in the oldest of the three age groups.

Table 18 presents the Ratios of Achievement to Expected Achievement for the three groups. Again the youngest children seem to approach more closely their expectancy than either of the two older groups. Judged by the ratio scores there is not much difference in the achievement of the middle and the oldest groups.

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Since the principal object of this study is to compare the achievements of mentally handicapped children in regular classes with those in special classes for the mentally retarded we have made an intensive study of this factor in the second achievement testing. It should be remembered in reading and interpreting the results of this study that all of the teachers knew that children were going to be retested. There is no doubt but that some of the special education teachers made a special effort to accomplish as much as they could with the children in their classes between the time of the first testing and the second testing. Whether this effect was so marked with the regular classroom teachers who had mentally handicapped children in their classes is rather more doubtful. In the first place there are many more of such teachers. In the second place two motives on the part of the regular class room teacher are probably operating. The first of these is based on sympathy and a certain tenderness for these children which make the teachers want to accomplish as much with them as they can. The second motive operates in the opposite direction, perhaps. Many teachers who have mentally handicapped children in their classes would be glad to have them transferred to special classes. There is also the factor of frustration and hopelessness which would perhaps cause these teachers to "give up" in working with these children.

Tables 19, 20, and 21 show an over-all comparison for the total group of 565 children who were in special education and a group of 200 who were in regular classes. Every comparison in these three tables shows that the children in regular classes are doing better work, whether we judge by the average scores of the children, by their deviations from expected achievement, or by the ratio of their achievement to expectancy. The difference is in the same direction for all of the separate scores and for the battery median on the Stanford Achievement Test. Almost all of the differences are highly significant statistically, the exception again being the arithmetic computation scores. We certainly cannot conclude from this observation that children of low mental ability should not be placed in special classes for the mentally handicapped. This issue is discussed in another section of the report.

Separate tabulations have been made comparing boys in special education and boys in regular classes, girls in special education and girls in regular classes, White children in special classes with White children in regular classes, and so on.

Tables 22, 23, and 24 present a comparison of the achievement of boys in special classes with that of boys in regular classes, and Tables 25, 26, and 27 present the same comparison for girls. In all six of these tables the margin is definitely in favor of the children in the regular classes. Again the only exceptions are in the case of the arithmetic scores, particularly the arithmetic computation scores. This seems to be the one school area in which the classes for the mentally handicapped come about as near achieving up to their expectancy as do the children in the regular classes. Of the 36 different scores tabulated in these tables all except one show that the average of the mentally handicapped children who are in regular classes is higher than the average of the mentally handicapped children in special classes. This one difference is only plus .02 for the ratio score for girls on the arithmetic computation section of the test.

Tables 28, 29, and 30 present a similar comparison for all of the White children studied, and Tables 31, 32, and 33 show the comparison for Negro children. All six tables show a superior performance for the mentally handicapped children in regular classes when they are compared with children of the same level of intelligence in special classes. The differences are not large but there is not one positive difference in favor of the children in the special classes for the mentally handicapped. This observation can be made from the comparison of scores, from a comparison of

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the deviations from expectancy, and from a comparison of the ratios of achievement. If we make a comparison of the first group of three tables for White children with the group of three tables for Negro children we see no striking significant difference between the effects of special education for White children and for Negro children.

A comparison has been made on the basis of the second administration of the Stanford Achievement Test for children in special classes with I. Q.'s 50 to 59 and regular class pupils of the same level of ability. The tabulations of the results are given in Tables 34, 35, and 36. Similar comparisons for children with I. Q.'s in the range 60 to 69 are shown in Tables 37, 38, and 39; and the comparison for children in the Binet I. Q. range 70 to 79 are shown in Tables 40, 41, and 42. The most significant observation perhaps may be made by studying all nine tables and noting that the columns of differences which contains a total of fifty-four differences is in favor of the children in special classes in all but three cases. These exceptions are for the arithmetic computation scores of children in the range of 50 to 59 I. Q. The critical ratios in all of these tables show somewhat less statistical significance than in some of the comparisons which have been studied but the very high consistency of the direction of the trend as well as the size of the differences cannot allow any conclusion except that the children in the regular classes are doing considerably better than the children in the special classes, whatever their intelligence as measured by the Binet.

Again, on the basis of the second achievement testing, we have made a comparison of the academic achievement of children of different ages when they are grouped on the basis of school placement that is, special class or regular classes.

Tables 43, 44, and 45 present this comparison for the age range 6 through 10 years. Tables 46, 47, and 48 present the comparison for the age range 11 through 13 years, and Tables 49, 50, and 51 give a comparison for the children in the age range 14 through 16 years. Of the 54 differences computed, all but four indicate the superiority of academic achievement of the children in the regular classes over the children in the special classes. These four instances are again in the case of the arithmetic computation scores, where the differences are insignificantly in favor of the group in special education.

No further explanation of the possible causes of the consistent superiority of the performance of mentally handicapped children in regular classes over that of similar children in the special education classes is offered in this section of the report. Some discussion was given in the previous section, and the general summary of the results and interpretations gives a more complete list of possible causes and explanations.

It was thought that a study of the differences in scores or, we might call them gains in scores, from the first testing to the second testing might be of some significance; and that study is presented as the next section of this report.

DESCRIPTION OF THE EXPERIMENTAL GROUP

Second Achievement Testing

Table 1

Summary

Total:	**765**			
Race:	**White**	**Negro**		
	536	**229**		
Sex:	**Male**	**Female**		
	481	**284**		
Race & Sex:	**White Male**	**White Female**	**Negro Male**	**Negro Female**
	326	**210**	**155**	**74**
Age	**6-10**	**11-13**	**14-16**	
	167	**335**	**263**	

Table 2

Age Distributions

Age	White Male	White Female	Negro Male	Negro Female
6-10	57	37	43	30
11-13	139	99	67	30
14-16	130	74	45	14

	White	Negro	Male	Female
6-10	94	73	100	67
11-13	238	97	206	129
14-16	204	59	175	88

DESCRIPTION OF THE EXPERIMENTAL GROUP

Second Achievement Testing

Table 3

Distribution of Intelligence Quotients

I. Q.	White Male	White Female	Negro Male	Negro Female	White	Negro	Male	Female	Total
50	4	3	1		7	1	5	3	8
51	8	3			11		8	3	11
52	3	5	1	1	8	2	4	6	10
53	9	6	4	1	15	5	13	7	20
54	12	4	2	2	16	4	14	6	20
55	8	4	2	1	12	3	10	5	15
56	7	8	2	1	15	3	9	9	18
57	5	7	5	4	12	9	10	11	21
58	13	10	4	2	23	6	17	12	29
59	2	6	6	2	8	8	8	8	16
60	10	9	6	1	19	7	16	10	26
61	11	8	5	1	19	6	16	9	25
62	10	6	3	1	16	4	13	7	20
63	10	10	10	3	20	13	20	13	33
64	8	6	9	4	14	13	17	10	27
65	15	10	9	3	25	12	24	13	37
66	9	12	8	4	21	12	17	16	33
67	8	7	5	2	15	7	13	9	22
68	11	7	11	4	18	15	22	11	33
69	18	7	6	2	25	8	24	9	33
70	21	8	9	5	29	14	30	13	43
71	24	8	10	7	32	17	34	15	49
72	15	11	9	1	26	10	24	12	36
73	17	9	6	5	26	11	23	14	37
74	16	11	6	5	27	11	22	16	38
75	11	6	5	2	17	7	16	8	24
76	11	4	5	1	15	6	16	5	21
77	9	5	2	2	14	4	11	7	18
78	6	5	2	6	11	8	8	11	19
79	15	5	2	1	20	3	17	6	23
Total	326	210	155	74	536	229	481	284	765
Mean	66.54	65.22	66.29	67.54	66.02	66.69	66.46	65.83	66.22

DESCRIPTION OF THE EXPERIMENTAL GROUP

Second Achievement Testing

Table 4

Distribution of Sex, Race, Age, and I. Q. for Special Classes and Regular Classes

	Special Classes*		Regular Classes**		Total	
	Number	Per Cent	Number	Per Cent	Number	Per Cent
Male	359	63.54	122	61.00	481	62.88
Female	206	36.46	78	39.00	284	37.12
White	444	78.58	92	46.00	536	70.07
Negro	121	21.42	108	54.00	229	29.93
50-59 I. Q.	147	26.02	21	10.50	168	21.96
60-69 I. Q.	217	38.41	72	36.00	289	37.78
70-79 I. Q.	201	35.57	107	53.50	308	40.26
6-10 Years	100	17.70	67	33.50	167	21.83
11-13 Years	267	47.26	68	34.00	335	43.79
14-17 Years	198	35.04	65	32.50	263	34.38
Total	565		200		765	

* Special Classes consist of children who have had more than three months in special education.

**Regular Classes consist of children who have never been in special education or have had only one, two, or three months.

DESCRIPTION OF THE EXPERIMENTAL GROUP

Second Achievement Testing

Table 5

School Placement and Age (Detail)

Age	Special Classes Number	Special Classes Per Cent	Regular Classes Number	Regular Classes Per Cent	Total Number	Total Per Cent
7,0 - 7,11	2	.35	2	1.00	4	.52
8,0 - 8,11	8	1.42	13	6.50	21	2.75
9,0 - 9,11	34	6.02	27	13.50	61	7.97
10,0 - 10,11	56	9.91	25	12.50	81	10.59
11,0 - 11,11	94	16.64	19	9.50	113	14.77
12,0 - 12,11	89	15.75	21	10.50	110	14.38
13,0 - 13,11	84	14.87	28	14.00	112	14.64
14,0 - 14,11	84	14.87	33	16.50	117	15.29
15,0 - 15,11	65	11.50	23	11.50	88	11.50
16,0 - 16,11	47	8.32	9	4.50	56	7.32
17,0 - 17,11	2	.35	0	.00	2	.26
Total	565		200		765	
Mean (Years)	13.02		12.44		12.87	

DESCRIPTION OF THE EXPERIMENTAL GROUP

Second Achievement Testing

Table 6

Months in Special Education

Months in Sp. Ed.	White Male	White Female	Negro Male	Negro Female	Total White	Total Negro	Total Male	Total Female	Total
0	52	38	68	40	90	108	120	78	198
1-3	2				2		2		2
4-6	2				2		2		2
7-9	31	25	8	1	56	9	39	26	65
10-12	23	13	7		36	7	30	13	43
13-15	31	20	4	2	51	6	35	22	57
16-18	33	24	18	9	57	27	51	33	84
19-21	15	9			24		15	9	24
22-24	25	16	8	3	41	11	33	19	52
25-27	22	11	20	5	33	25	42	16	58
28-30	5	6			11		5	6	11
31-33	20	11			31		20	11	31
34-36	13	5	13	6	18	19	26	11	37
37-39	5	1			6		5	1	6
40-42	15	14		1	29	1	15	15	30
43-45	16	5	5	7	21	12	21	12	33
Over 46	16	12	4		28	4	20	12	32
Total	326	210	155	74	536	229	481	284	765
Mean	20.37	19.34	13.49	12.80	19.96	13.27	18.15	17.63	17.96

SCHOOL ACHIEVEMENT AND SEX

Second Achievement Testing
Comparison of Boys and Girls
Group 1 - Boys   Group 2 - Girls

Table 7

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	476	283	2.41	2.72	1.11	1.18	-.31	3.58
Word Meaning	477	284	2.45	2.77	1.10	1.20	-.32	3.67
Spelling	480	281	2.52	3.06	1.38	1.49	-.54	4.96
Arithmetic Reasoning	481	283	2.66	2.68	1.25	1.25	-.02	.21
Arithmetic Computation	480	284	3.13	3.07	1.35	1.28	.06	.61
Battery Median	480	284	2.55	2.80	1.13	1.18	-.25	2.87

Table 8

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	476	283	-.97	-.40	1.24	1.03	-.57	6.83
Word Meaning	477	284	-.96	-.37	1.24	1.03	-.59	7.07
Spelling	480	281	-.88	-.06	1.40	1.27	-.82	8.27
Arithmetic Reasoning	481	283	-.74	-.47	1.05	.88	-.27	3.81
Arithmetic Computation	480	284	-.24	-.04	1.05	.90	-.20	2.79
Battery Median	480	284	-.83	-.32	1.12	.95	-.51	6.70

Table 9

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	468	272	.81	.95	.35	.34	-.14	5.34
Word Meaning	469	273	.81	.96	.34	.35	-.15	5.68
Spelling	472	270	.82	1.06	.42	.44	-.24	7.27
Arithmetic Reasoning	473	272	.85	.91	.30	.28	-.06	2.73
Arithmetic Computation	472	273	1.02	1.06	.33	.32	-.04	1.63
Battery Median	472	273	.83	.97	.32	.31	-.14	5.86

SCHOOL ACHIEVEMENT AND RACE

Second Achievement Testing
Comparison of White and Negro Pupils
Group 1 - White Pupils Group 2 - Negro Pupils

Table 10

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	533	226	2.5[illegible]	2.47	1.13	1.17	.09	.98
Word Meaning	535	226	2.62	2.44	1.16	1.09	.18	2.04
Spelling	534	227	2.78	2.57	1.43	1.48	.21	1.81
Arithmetic Reasoning	535	229	2.75	2.48	1.26	1.17	.27	2.88
Arithmetic Computation	535	229	3.25	2.78	1.32	1.27	.47	4.63
Battery Median	536	228	2.70	2.51	1.17	1.13	.19	2.10

Table 11

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	533	226	-.85	-.53	1.19	1.13	-.32	3.51
Word Meaning	535	226	-.81	-.57	1.24	1.13	-.24	2.60
Spelling	534	227	-.63	-.45	1.39	1.42	-.18	1.61
Arithmetic Reasoning	535	229	-.68	-.56	1.03	.95	-.12	1.48
Arithmetic Computation	535	229	-.15	-.22	1.05	.95	.07	.84
Battery Median	536	228	-.70	-.51	1.12	1.05	-.19	2.14

Table 12

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	522	218	.84	.91	.33	.39	-.07	2.33
Word Meaning	524	218	.85	.89	.34	.37	-.04	1.37
Spelling	523	219	.90	.92	.42	.48	-.02	.54
Arithmetic Reasoning	524	221	.87	.88	.29	.31	-.01	.41
Arithmetic Computation	524	221	1.05	1.00	.34	.31	.05	1.95
Battery Median	525	220	.87	.91	.32	.35	-.04	1.46

SCHOOL ACHIEVEMENT AND INTELLIGENCE LEVEL

Second Achievement Testing

Comparison of Three I.Q. (Binet) Groups
Group 1 - I.Q. 50-59 Group 2 - I.Q. 60-69 Group 3 - I.Q. 70-79

Table 13

Scores on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	167	285	307	2.10	2.49	2.80	.99	1.06	1.22	.39	.70	.31	3.98	6.76	3.30
Word Meaning	168	286	307	2.19	2.54	2.80	1.02	1.08	1.21	.35	.61	.26	3.46	5.8[illegible]	2.76
Spelling	167	288	306	2.33	2.70	2.96	1.34	1.48	1.41	.37	.63	.26	3.11	5.89	2.19
Arithmetic Reasoning	167	289	308	2.15	2.62	3.00	.99	1.18	1.31	.47	.85	.38	4.55	7.94	3.72
Arithmetic Computation	167	289	308	2.50	3.09	3.46	1.10	1.25	1.36	.59	.96	.37	5.24	8.34	3.46
Battery Median	168	289	307	2.19	2.60	2.93	1.01	1.12	1.18	.41	.74	.33	4.02	7.18	3.50

Table 14

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	167	285	307	-.25	-.72	-1.07	.92	1.08	1.33	-.47	-.82	-.35	4.91	7.88	3.53
Word Meaning	168	286	307	-.21	-.68	-1.09	.98	1.07	1.34	-.47	-.88	-.41	4.77	8.18	4.13
Spelling	167	288	306	-.06	-.53	-.91	1.17	1.40	1.43	-.47	-.85	-.38	3.84	6.97	3.27
Arithmetic Reasoning	167	289	308	-.25	-.61	-.88	.87	.94	1.06	-.36	-.63	-.27	4.13	6.97	3.20
Arithmetic Computation	167	289	308	.16	-.12	-.38	.87	.98	1.04	-.38	-.54	-.26	4.29	6.02	3.15
Battery Median	168	289	307	-.17	-.61	-.94	.84	1.04	1.16	-.44	-.77	-.33	4.94	8.31	3.66

SCHOOL ACHIEVEMENT AND INTELLIGENCE LEVEL

Second Achievement Testing

Comparison of Three I.Q. (Binet) Groups

Group 1 - I.Q. 50-59 Group 2 - I.Q. 60-69 Group 3 - I.Q. 70-79

Table 15

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	156	278	306	.82	.76	.73	.38	.35	.34	-.06	-.09	-.03	1.64	2.50	1.06
Word Meaning	157	279	306	.83	.77	.72	.38	.35	.33	-.06	-.11	-.05	1.63	3.10	1.75
Spelling	156	281	305	.88	.82	.76	.48	.46	.39	-.06	-.12	-.06	1.27	2.69	1.69
Arithmetic Reasoning	156	282	307	.83	.76	.74	.33	.28	.28	-.07	-.09	-.02	2.27	2.93	.85
Arithmetic Computation	156	282	307	1.01	.94	.89	.38	.34	.28	-.07	-.12	-.05	1.92	3.61	1.94
Battery Median	157	282	306	.85	.78	.75	.35	.34	.29	-.07	-.10	-.03	2.02	3.05	1.15

SCHOOL ACHIEVEMENT AND AGE LEVEL

Second Achievement Testing
Comparison of Three Age Groups
Group 1 - Age 6 - 10 Years Group 2 - Age 11 - 13 Years Group 3 - Age 14 - 16 Years

Table 16

Scores on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	166	334	259	1.86	2.43	3.08	.77	1.04	1.21	.57	1.22	.65	6.91	12.70	6.89
Word Meaning	166	334	261	1.89	2.45	3.15	.80	.99	1.23	.56	1.26	.70	6.80	12.83	7.49
Spelling	166	334	261	1.93	2.62	3.35	1.05	1.36	1.48	.69	1.42	.73	6.25	11.58	6.19
Arithmetic Reasoning	167	334	263	1.68	2.56	3.44	.72	1.09	1.18	.88	1.76	.88	10.78	19.21	9.35
Arithmetic Computation	167	335	262	2.06	3.02	3.90	.83	1.12	1.30	.96	1.84	.88	10.82	17.90	8.71
Battery Median	166	335	263	1.84	2.54	3.28	.76	1.03	1.16	.70	1.44	.74	8.59	15.53	8.13

Table 17

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	166	334	259	-.06	-.78	-1.17	.90	1.06	1.31	-.72	-1.11	-.39	7.93	10.34	3.90
Word Meaning	166	334	261	-.03	-.80	-1.11	.89	1.02	1.38	-.77	-1.08	-.31	8.67	9.83	3.04
Spelling	166	334	261	-.03	-.59	-.92	1.04	1.29	1.62	-.56	-.89	-.33	5.22	6.92	2.69
Arithmetic Reasoning	167	334	263	-.28	-.68	-.82	.74	.92	1.16	-.40	-.54	-.14	5.25	5.90	1.60
Arithmetic Computation	167	335	262	.21	-.19	-.38	.77	.90	1.21	-.40	-.59	-.19	5.17	6.17	2.12
Battery Median	166	335	263	-.05	-.68	-.97	.80	.97	1.24	-.63	-.92	-.29	7.72	9.34	3.12

SCHOOL ACHIEVEMENT AND AGE LEVEL

Second Achievement Testing
Comparison of Three Age Groups

Group 1 Age 6 - 10 Years Group 2 Age 11 - 13 Years Group 3 Age 14 - 16 Years

Table 18

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	148	333	259	.92	.73	.70	.45	.33	.28	-.19	-.22	-.03	4.61	5.38	1.20
Word Meaning	148	333	261	.93	.72	.72	.46	.32	.29	-.21	-.21	.00	5.04	5.02	0.00
Spelling	148	333	261	.92	.78	.78	.55	.42	.38	-.14	-.14	.00	2.76	2.75	0.00
Arithmetic Reasoning	149	333	263	.79	.75	.78	.34	.29	.26	-.04	-.01	.03	1.25	.31	1.33
Arithmetic Computation	149	334	262	1.05	.91	.89	.39	.32	.29	-.14	-.16	-.02	3.84	4.37	.79
Battery Median	148	334	263	.91	.75	.76	.41	.31	.27	-.16	-.15	.01	4.24	3.99	.42

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Total Groups
Group 1 - Special Classes   Group 2 - Regular Classes

Table 19

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	560	199	2.38	2.95	1.11	1.14	-.57	6.10
Word Meaning	562	199	2.45	2.91	1.14	1.09	-.46	5.05
Spelling	563	198	2.57	3.14	1.39	1.51	-.57	4.66
Arithmetic Reasoning	564	200	2.59	2.89	1.20	1.30	-.30	2.86
Arithmetic Computation	564	200	3.08	3.20	1.28	1.44	-.12	1.04
Battery Median	565	199	2.52	2.98	1.14	1.16	-.46	4.83

Table 20

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	560	199	-.89	-.39	1.13	1.28	-.50	4.88
Word Meaning	562	199	-.85	-.42	1.19	1.22	-.43	4.30
Spelling	563	198	-.71	-.18	1.35	1.47	-.53	4.45
Arithmetic Reasoning	564	200	-.70	-.47	1.00	.99	-.23	2.82
Arithmetic Computation	564	200	-.18	-.13	.99	1.00	-.05	.62
Battery Median	565	199	-.75	-.34	1.05	1.11	-.41	4.55

Table 21

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	549	191	.71	.91	.33	.37	-.20	6.62
Word Meaning	551	191	.72	.89	.34	.35	-.17	5.82
Spelling	552	190	.75	.96	.42	.48	-.21	5.36
Arithmetic Reasoning	553	192	.75	.84	.28	.30	-.09	3.64
Arithmetic Computation	553	192	.93	.94	.33	.32	-.01	.37
Battery Median	554	191	.74	.91	.32	.32	-.17	6.32

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Boys
Group 1 - Special Classes Group 2 - Regular Classes

Table 22

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	355	121	2.29	2.78	1.07	1.12	-.49	4.20
Word Meaning	356	121	2.33	2.79	1.07	1.13	-.46	3.92
Spelling	359	121	2.40	2.90	1.31	1.51	-.50	3.25
Arithmetic Reasoning	359	122	2.59	2.87	1.20	1.33	-.28	2.06
Arithmetic Computation	358	122	3.11	3.21	1.29	1.50	-.10	.66
Battery Median	359	121	2.43	2.88	1.08	1.23	-.45	3.59

Table 23

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	355	121	-1.07	-.68	1.18	1.32	-.39	2.88
Word Meaning	356	121	-1.06	-.66	1.24	1.26	-.40	3.03
Spelling	359	121	- .99	-.54	1.33	1.47	-.45	2.98
Arithmetic Reasoning	359	122	- .79	-.59	1.04	1.07	-.20	1.80
Arithmetic Computation	358	122	- .25	-.22	1.07	1.05	-.03	.27
Battery Median	359	121	- .94	-.54	1.11	1.18	-.40	3.27

Table 24

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	349	119	.66	.84	.33	.38	-.18	4.66
Word Meaning	350	119	.66	.83	.33	.35	-.17	4.66
Spelling	353	119	.67	.85	.40	.46	-.18	3.82
Arithmetic Reasoning	353	120	.73	.81	.28	.32	-.08	2.45
Arithmetic Computation	352	120	.91	.92	.33	.33	-.01	.29
Battery Median	353	119	.69	.86	.31	.33	-.17	4.89

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Girls
Group 1 - Special Classes   Group 2 - Regular Classes

Table 25

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	205	78	2.53	3.22	1.15	1.10	-.69	4.66
Word Meaning	206	78	2.64	3.09	1.24	1.00	-.45	3.16
Spelling	204	77	2.88	3.52	1.47	1.42	-.64	3.34
Arithmetic Reasoning	205	78	2.59	2.93	1.22	1.26	-.34	2.05
Arithmetic Computation	206	78	3.03	3.19	1.24	1.36	-.16	.91
Battery Median	206	78	2.69	3.12	1.19	1.06	-.43	2.95

Table 26

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	205	78	-.58	.07	.97	1.03	-.65	4.82
Word Meaning	206	78	-.49	-.05	1.02	1.03	-.44	3.22
Spelling	204	77	-.23	.38	1.22	1.30	-.61	3.57
Arithmetic Reasoning	205	78	-.55	-.28	.88	.85	-.27	2.36
Arithmetic Computation	206	78	-.06	.01	.89	.94	-.07	.57
Battery Median	206	78	-.43	-.04	.93	.93	-.39	3.16

Table 27

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	200	72	.78	1.03	.32	.35	-.25	5.39
Word Meaning	201	72	.81	.99	.34	.33	-.18	3.92
Spelling	199	71	.90	1.14	.41	.46	-.24	3.91
Arithmetic Reasoning	200	72	.78	.89	.28	.27	-.11	2.96
Arithmetic Computation	201	72	.97	.95	.34	.30	.02	.47
Battery Median	201	72	.83	.99	.31	.28	-.16	4.01

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
White
Group 1 - Special Classes Group 2 - Regular Classes

Table 28

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	441	92	2.48	2.90	1.14	1.01	-.42	3.54
Word Meaning	443	92	2.56	2.93	1.18	1.02	-.37	3.08
Spelling	442	92	2.71	3.15	1.44	1.29	-.44	2.92
Arithmetic Reasoning	443	92	2.70	3.01	1.25	1.27	-.31	2.14
Arithmetic Computation	443	92	3.23	3.35	1.32	1.33	-.12	.79
Battery Median	444	92	2.64	2.98	1.17	1.08	-.34	2.71

Table 29

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	441	92	-.91	-.59	1.15	1.36	-.32	2.11
Word Meaning	443	92	-.86	-.59	1.22	1.28	-.27	1.86
Spelling	442	92	-.70	-.32	1.38	1.43	-.38	2.33
Arithmetic Reasoning	443	92	-.71	-.49	1.00	1.05	-.22	1.84
Arithmetic Computation	443	92	-.15	-.12	1.06	1.02	-.03	.25
Battery Median	444	92	-.75	-.46	1.08	1.17	-.29	2.19

Table 30

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	116	102	.69	.95	.36	.36	-.26	5.26
Word Meaning	116	102	.68	.92	.36	.34	-.24	5.07
Spelling	118	101	.69	.98	.42	.51	-.29	4.57
Arithmetic Reasoning	118	103	.72	.84	.29	.32	-.12	2.92
Arithmetic Computation	118	103	.88	.92	.30	.33	-.04	.95
Battery Median	118	102	.71	.94	.33	.33	-.23	5.15

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Negroes
Group 1 - Special Classes   Group 2 - Regular Classes

Table 31

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	119	107	1.99	2.99	.89	1.24	-1.00	6.90
Word Meaning	119	107	2.04	2.89	.86	1.15	- .85	6.24
Spelling	121	106	2.07	3.14	1.06	1.68	-1.07	5.65
Arithmetic Reasoning	121	108	2.20	2.79	.92	1.33	- .59	6.35
Arithmetic Computation	121	108	2.53	3.07	.91	1.53	- .54	3.20
Battery Median	121	107	2.10	2.97	.82	1.24	- .87	6.16

Table 32

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	119	107	-.81	-.22	1.07	1.16	-.59	3.96
Word Meaning	119	107	-.83	-.27	1.04	1.12	-.56	3.88
Spelling	121	106	-.79	-.07	1.22	1.52	-.72	3.90
Arithmetic Reasoning	121	108	-.65	-.46	.92	.98	-.19	1.51
Arithmetic Computation	121	108	-.29	-.14	.86	1.02	-.15	1.20
Battery Median	121	107	-.75	-.24	.99	1.03	-.51	3.80

Table 33

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	433	89	.71	.87	.32	.38	-.16	3.69
Word Meaning	435	89	.73	.86	.34	.35	-.13	3.19
Spelling	434	89	.77	.93	.41	.45	-.16	3.12
Arithmetic Reasoning	435	89	.75	.84	.28	.28	-.09	2.76
Arithmetic Computation	435	89	.95	.95	.34	.31	.00	.00
Battery Median	436	89	.75	.88	.31	.31	-.13	3.62

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
I.Q. 50-59
Group 1 - Special Classes Group 2 - Regular Classes

Table 34

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	146	21	2.02	2.63	.96	1.00	-.61	2.63
Word Meaning	147	21	2.12	2.65	1.02	.89	-.53	2.50
Spelling	146	21	2.23	2.99	1.33	1.27	-.76	2.55
Arithmetic Reasoning	146	21	2.11	2.37	1.01	.88	-.26	1.24
Arithmetic Computation	146	21	2.51	2.42	1.13	.87	.09	.43
Battery Median	147	21	2.13	2.63	1.01	.90	-.50	2.34

Table 35

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	146	21	-.31	.21	.85	1.25	-.52	1.85
Word Meaning	147	21	-.27	.21	.95	1.06	-.48	1.97
Spelling	146	21	-.14	.52	1.11	1.28	-.66	2.24
Arithmetic Reasoning	146	21	-.28	-.06	.84	.93	-.22	1.03
Arithmetic Computation	146	21	.18	.02	.86	.93	.16	.74
Battery Median	147	21	-.22	.18	.81	.97	-.40	1.80

Table 36

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	138	18	.79	1.04	.37	.39	-.25	2.60
Word Meaning	139	18	.81	1.04	.37	.36	-.23	2.54
Spelling	138	18	.85	1.15	.47	.47	-.30	2.54
Arithmetic Reasoning	138	18	.82	.92	.33	.27	-.10	1.42
Arithmetic Computation	138	18	1.02	.93	.39	.31	.09	1.11
Battery Median	139	18	.83	1.02	.35	.31	-.19	2.41

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
I. Q. 60-69
Group 1 - Special Classes Group 2 - Regular Classes

Table 37

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	213	72	2.38	2.80	1.07	.98	-.42	3.07
Word Meaning	214	72	2.48	2.74	1.09	1.00	-.26	1.87
Spelling	216	72	2.58	3.04	1.44	1.56	-.46	2.21
Arithmetic Reasoning	217	72	2.56	2.78	1.14	1.28	-.22	1.30
Arithmetic Computation	217	72	3.10	3.06	1.27	1.26	.04	.23
Battery Median	217	72	2.52	2.86	1.11	1.12	-.34	2.24

Table 38

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	213	72	-.82	-.44	1.02	1.17	-.38	2.46
Word Meaning	214	72	-.75	-.47	1.04	1.11	-.28	1.88
Spelling	216	72	-.65	-.17	1.36	1.49	-.48	2.42
Arithmetic Reasoning	217	72	-.65	-.50	.91	1.00	-.15	1.13
Arithmetic Computation	217	72	-.10	-.19	1.00	.98	.09	.67
Battery Median	217	72	-.69	-.36	1.02	1.08	-.33	2.28

Table 39

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	210	68	.72	.88	.33	.37	-.16	3.19
Word Meaning	211	68	.74	.86	.35	.33	-.12	2.55
Spelling	213	68	.77	.95	.44	.50	-.18	2.67
Arithmetic Reasoning	214	68	.75	.81	.27	.27	-.06	1.57
Arithmetic Computation	214	68	.95	.92	.34	.34	.03	.64
Battery Median	214	68	.75	.89	.34	.33	-.14	3.06

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
I.Q. 70-79
Group 1 - Special Classes Group 2 - Regular Classes

Table 40

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	201	106	2.64	3.11	1.18	1.24	-.47	3.21
Word Meaning	201	106	2.66	3.07	1.21	1.16	-.41	2.90
Spelling	201	105	2.81	3.24	1.33	1.51	-.43	2.46
Arithmetic Reasoning	201	107	2.97	3.07	1.28	1.36	-.10	.63
Arithmetic Computation	201	107	3.47	3.45	1.23	1.58	.02	.11
Battery Median	201	106	2.82	3.12	1.15	1.22	-.30	2.09

Table 41

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	201	106	-1.38	-.48	1.22	1.31	-.90	5.86
Word Meaning	201	106	-1.39	-.51	1.27	1.26	-.88	5.80
Spelling	201	105	-1.21	-.33	1.31	1.47	-.88	5.16
Arithmetic Reasoning	201	107	-1.06	-.53	1.04	.99	-.53	4.39
Arithmetic Computation	201	107	- .53	-.12	1.03	1.04	-.41	3.31
Battery Median	201	106	-1.20	-.44	1.10	1.14	-.76	5.62

Table 42

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	201	105	.63	.91	.28	.37	-.28	6.80
Word Meaning	201	105	.63	.89	.29	.35	-.26	6.52
Spelling	201	104	.67	.93	.32	.46	-.26	5.17
Arithmetic Reasoning	201	106	.69	.84	.25	.32	-.15	4.21
Arithmetic Computation	201	106	.86	.95	.26	.31	-.09	2.56
Battery Median	201	105	.67	.90	.24	.32	-.23	6.50

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 6 - 10 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 43

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	100	66	1.57	2.29	.70	.67	-.72	6.65
Word Meaning	100	66	1.66	2.23	.76	.73	-.57	4.84
Spelling	100	66	1.67	2.33	.88	1.15	-.66	6.69
Arithmetic Reasoning	100	67	1.55	1.87	.62	.81	-.32	2.74
Arithmetic Computation	100	67	2.01	2.14	.81	.85	-.13	.99
Battery Median	100	66	1.63	2.16	.67	.75	-.53	4.65

Table 44

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	100	66	-.37	.41	.87	.71	-.78	6.33
Word Meaning	100	66	-.29	.38	.94	.65	-.67	5.43
Spelling	100	66	-.31	.41	.94	1.05	-.72	4.51
Arithmetic Reasoning	100	67	-.40	-.09	.73	.74	-.31	2.67
Arithmetic Computation	100	67	.16	.28	.77	.70	-.12	1.04
Battery Median	100	66	-.31	.35	.80	.62	-.66	5.97

Table 45

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	90	58	.75	1.17	.42	.37	-.42	6.42
Word Meaning	90	58	.79	1.14	.47	.34	-.35	5.23
Spelling	90	58	.78	1.14	.49	.58	-.36	3.93
Arithmetic Reasoning	90	59	.72	.90	.30	.37	-.18	3.10
Arithmetic Computation	90	59	1.03	1.07	.40	.36	-.04	.63
Battery Median	90	58	.78	1.11	.41	.33	-.33	5.41

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 11 - 13 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 46

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	266	68	2.27	3.07	.97	1.04	-.80	5.74
Word Meaning	266	68	2.29	3.08	.94	.96	-.79	6.08
Spelling	266	68	2.43	3.36	1.28	1.44	-.93	4.86
Arithmetic Reasoning	266	68	2.43	3.06	1.05	1.11	-.63	4.22
Arithmetic Computation	267	68	2.93	3.39	1.08	1.23	-.46	2.82
Battery Median	267	68	2.39	3.13	.98	1.03	-.74	5.34

Table 47

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	266	68	-.84	-.56	1.01	1.24	-.28	1.72
Word Meaning	266	68	-.86	-.56	1.00	1.15	-.30	1.97
Spelling	266	68	-.68	-.24	1.22	1.47	-.44	2.28
Arithmetic Reasoning	266	68	-.71	-.57	.90	1.05	-.14	1.01
Arithmetic Computation	267	68	-.18	-.22	.87	.97	.04	.31
Battery Median	267	68	-.73	-.50	.95	1.12	-.23	1.56

Table 48

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	265	68	.70	.85	.33	.33	-.15	3.35
Word Meaning	265	68	.69	.84	.31	.30	-.15	3.65
Spelling	265	68	.74	.93	.42	.41	-.19	3.42
Arithmetic Reasoning	265	68	.73	.82	.29	.27	-.09	2.39
Arithmetic Computation	266	68	.92	.90	.33	.26	.02	.51
Battery Median	266	68	.73	.86	.31	.29	-.13	3.22

SCHOOL ACHIEVEMENT AND SCHOOL PLACEMENT

Second Achievement Testing
Comparison of Special Class and Regular Class Pupils
Age 14 - 16 Years
Group 1 - Special Classes   Group 2 - Regular Classes

Table 49

Scores on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	194	65	2.94	3.49	1.16	1.28	-.55	3.07
Word Meaning	196	65	3.06	3.41	1.23	1.18	-.35	2.05
Spelling	197	64	3.22	3.75	1.44	1.54	-.53	2.43
Arithmetic Reasoning	198	65	3.33	3.77	1.16	1.18	-.44	2.62
Arithmetic Computation	197	65	3.83	4.09	1.25	1.46	-.26	1.29
Battery Median	198	65	3.16	3.65	1.14	1.15	-.49	2.99

Table 50

Deviations from Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	194	65	-1.22	-1.03	1.31	1.34	-.19	.99
Word Meaning	196	65	-1.12	-1.09	1.42	1.27	-.03	.16
Spelling	197	64	-.98	-.73	1.61	1.63	-.25	1.07
Arithmetic Reasoning	198	65	-.84	-.76	1.18	1.11	-.08	.50
Arithmetic Computation	197	65	-.35	-.45	1.21	1.16	.10	.60
Battery Median	198	65	-1.00	-.88	1.27	1.14	-.12	.72

Table 51

Ratios of Achievement to Expectancy on Stanford Achievement Test

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	194	65	.69	.75	.27	.30	-.06	1.43
Word Meaning	196	65	.71	.73	.30	.28	-.02	.49
Spelling	197	64	.76	.82	.38	.39	-.06	1.08
Arithmetic Reasoning	198	65	.78	.80	.27	.25	-.02	.56
Arithmetic Computation	197	65	.91	.85	.29	.27	.06	1.51
Battery Median	198	65	.75	.78	.27	.26	-.03	.81

SECTION IV

ONE-YEAR GAINS IN ACHIEVEMENT

The group of 750 children for whom we have two test scores have been studied to see if any further significant relations can be found between any of the variables in which we are interested and school achievement. The results are essentially the same as those reported in the two previous studies but may be summarized rather briefly here.

Table 1 shows the one-year gains in the five separate scores and in the battery median for the Stanford Achievement Test over a period of approximately, slightly less, one school year. It will be noticed that the average gain has been computed as well as the battery median. The row of means at the bottom of the table shows that the average gain as well as the gain in battery median for the school year studied was about forty-two hundredths of a year. Considering that the average intelligence of all of the children in this group as measured by the Binet was about 66, the gain of a little over .4 of a year in achievement is less than we should have expected. It is pretty clear that the mentally handicapped children are not achieving as much in an academic way as we should expect them to achieve. There is, of course, the possibility that the measures which we have used, namely, scores, deviations, and ratios are not adequate ways of measuring the results of school work; but they are very commonly used and for want of a better measure we have used them here.

The tabulations in Table 2 show no significant differences between the academic gains of boys and girls in the years studied. Table 3 shows no significant differences in the academic gains of White children and Negro children. Table 4 shows practically no significant differences in the achievement of children at different levels of intelligence, and Table 5 shows that the age differences again contain very few significant differences in achievement. The only critical ratios in these two tables which show statistical significance are based on the difference between the lowest I. Q. group and the highest I. Q. group, skipping the middle group, and between the lowest age group and the highest age group, again skipping the middle group.

Table 6 summarizes the gains of all the children in special education and all of the children in regular classes. The means in the next to the last row of the table show no significant differences between these two groups for the years studied.

Making comparisons similar to those in the two previous sections of the report for special class male students with regular class male students, special class female students with regular class female students, White children in regular classes with White children in special classes, Negro children in special classes with Negro children in regular classes, children of three levels of intelligence in regular classes with children of the same levels of ability in special classes, and three age groups in special classes with equivalent age groups in regular classes, we find practically no significant differences in favor of either the special class or the regular class. The difference is not significant for a one-year period except in the case of the lowest I. Q. group in the range from 50 to 59. These data are shown in Table 12, and although the differences are small, some of them are moderately significant. It is not felt, however, that any conclusion in favor of either special classes or regular classes can be drawn from the data in these tables.

A COMPARISON OF EXPECTED GAINS AND OBTAINED GAINS

For each of the children for whom we have two test records we have computed the difference between his expected score at the time of the second achievement testing and his expected achievement at the time of the first testing. This means that the difference in mental ages at the two testing times has been translated to a ten-month scale rather than a twelve-month scale. This has been done because the achievement test is standardized on the basis of tenths of a school year. Table 18 shows the frequency distribution of the months gained in mental age for the total group, the expected frequencies of expected gains and the frequencies of actually obtained gains. It is of course significant that the range of obtained gains is considerably greater than the range of expected gains. No child lost in chronological age so did not loose in mental age and therefore we had no negative expected gains. However, there was a fairly large number of children who actually had zero or negative gains for the school year. At the other end of the scale a few children made considerably higher gains than they might have been expected to make. One wonders whether these discrepancies are in some cases due to inaccuracies in measurement or to great differences in motivation of the pupil at the time he took the tests, or to some other factor which is difficult to interpret. The average expected gain for the total group is .48 years. The actually obtained gain is .41 plus gains. The obtained gain is 85.6 per cent of the expected gain. If this percentage can be taken as a measure of the efficiency of the school in training these children, it is fairly satisfactory. One is even tempted to wonder whether a group of normal children or of superior children would gain close to 86 per cent of their expectancy based on their Binet mental ages.

The averages just given here, however, do not tell the whole story. The discrepancies for individual pupils are sometimes very large and we have made another analysis by plotting the correlation chart for these two variables. This is shown in Figure 1 of this section. On the base line are plotted the expected gains in battery median achievement on the Stanford Achievement Test. On the vertical axis are plotted the actually obtained gains. Each / represents one case and shows for that child both his expected score and his obtained score. When the Pearson product-moment correlation coefficient for this distribution is calculated it is found to be + .065. This indicates that for our group there was practically no correlation between the gain the child was expected to make and the gain he actually made. This is a serious finding and surely indicates that we could be accomplishing more with these children than we are.

TABLE 1

ONE-YEAR GAINS IN SCORES ON STANFORD ACHIEVEMENT TEST

Total Groups

Scores From	To	Paragraph Meaning	Word Meaning	Spelling	Arithmetic Reasoning	Arithmetic Computation	Battery Median	Average Gain
-2.0	-1.9			1				
-1.8	-1.7	1						
-1.6	-1.5			1				
-1.4	-1.3	3				2	1	
-1.2	-1.1	1	2	1	2			
-1.0	- .9	7	1	2	3	3	1	
- .8	- .7	4	4	1	9	7	1	1
- .6	- .5	13	9	8	13	4	5	3
- .4	- .3	19	23	15	22	15	7	3
- .2	- .1	50	50	39	49	39	32	23
0.0	.1	158	180	205	129	152	154	98
.2	.3	110	121	107	120	133	147	192
.4	.5	105	122	102	115	102	150	195
.6	.7	73	92	116	98	95	118	143
.8	.9	80	56	55	76	79	69	56
1.0	1.1	61	43	37	47	50	36	25
1.2	1.3	34	25	27	26	31	13	5
1.4	1.5	19	14	3	22	18	8	2
1.6	1.7	4	5	10	9	9	4	2
1.8	1.9	3	1	1	6	3		1
2.0	2.1	2	2	4	3	3	2	
2.2	2.3			2		2	1	
2.4	2.5	2		2	1			
2.6	2.7			2		1		
2.8	2.9	1			1			
3.0	3.1			3				
Total		750	750	744	748	748	749	749
Mean		.42	.38	.42	.44	.46	.42	.42
S.D.		.54	.45	.52	.52	.50	.39	.31

TABLE 2

ONE-YEAR GAINS AND SEX

Comparison of Boys and Girls by Gains on Stanford Achievement Test
Group 1 - Boys Group 2 - Girls

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	471	279	.43	.41	.54	.54	.02	.49
Word Meaning	471	279	.37	.40	.45	.48	-.03	.85
Spelling	469	275	.38	.48	.51	.54	-.10	2.49
Arithmetic Reasoning	471	277	.44	.44	.52	.51	.00	.00
Arithmetic Computation	470	278	.45	.47	.51	.49	-.02	.53
Battery Median	471	278	.42	.42	.39	.40	.00	.00
Average Gain	471	278	.41	.44	.30	.32	-.03	1.27

TABLE 3

ONE-YEAR GAINS AND RACE

Comparison of White Pupils and Negro Pupils by Gains on Stanford Achievement Test
Group 1 - White Pupils Group 2 - Negro Pupils

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	523	227	.42	.43	.54	.54	-.01	.23
Word Meaning	523	227	.40	.34	.47	.42	.06	1.73
Spelling	517	227	.45	.35	.51	.54	.10	2.36
Arithmetic Reasoning	521	227	.46	.38	.52	.51	.08	1.96
Arithmetic Computation	521	227	.47	.44	.49	.53	.03	.73
Battery Median	522	227	.43	.38	.41	.36	.05	1.67
Average Gain	522	227	.44	.38	.31	.30	.06	2.49

TABLE 4

ONE-YEAR GAINS AND INTELLIGENCE LEVEL

Comparison of Three Groups by Gains on Stanford Achievement Test
Group 1 - I. Q 50-59 Group 2 - I. Q. 60-69 Group 3 - I. Q. 70-79

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	166	276	306	.34	.41	.48	.49	.53	.57	.07	.14	.07	1.41	2.79	1.54
Word Meaning	166	276	306	.32	.36	.43	.45	.45	.46	.04	.11	.07	.90	2.52	1.85
Spelling	162	275	305	.35	.42	.45	.47	.57	.50	.07	.10	.03	1.39	2.14	.67
Arithmetic Reasoning	164	276	306	.41	.43	.47	.49	.50	.55	.02	.06	.04	.41	1.21	.92
Arithmetic Computation	164	276	306	.42	.42	.52	.50	.49	.51	.00	.10	.10	.00	2.05	2.41
Battery Median	165	276	306	.33	.41	.47	.38	.42	.37	.08	.14	.06	2.06	3.85	1.82
Average Gain	165	276	306	.36	.41	.47	.29	.32	.31	.05	.11	.06	1.68	3.83	2.29

TABLE 5

ONE-YEAR GAINS AND AGE

Comparison of Three Age Groups by Gains on Stanford Achievement Test
Group 1 - Age 6 - 10 Years Group 2 - Age 11 - 13 Years Group 3 - Age 14 - 16 Years

	N_1	N_2	N_3	M_1	M_2	M_3	SD_1	SD_2	SD_3	D_{2-1}	D_{3-1}	D_{3-2}	CR_1	CR_2	CR_3
Paragraph Meaning	257	330	163	.51	.37	.39	.45	.54	.63	-.14	-.12	.02	-3.42	-2.11	.35
Word Meaning	257	330	163	.43	.34	.39	.46	.45	.47	-.09	-.04	.05	-2.37	-.86	1.13
Spelling	256	326	162	.47	.40	.36	.51	.53	.52	-.07	-.11	-.04	-1.62	-2.12	.80
Arithmetic Reasoning	256	329	163	.48	.42	.41	.51	.52	.53	-.06	-.07	-.01	-1.40	-1.34	.20
Arithmetic Computation	256	330	162	.52	.45	.38	.49	.49	.54	-.07	-.14	-.07	-1.72	-2.68	1.39
Battery Median	256	330	163	.49	.37	.39	.39	.37	.44	-.12	-.10	.02	-3.77	-2.37	.50
Average Gain	256	330	163	.48	.40	.38	.31	.40	.31	-.08	-.10	-.02	-2.73	-3.22	.61

ONE-YEAR GAINS IN SCORES ON STANFORD ACHIEVEMENT TEST

Table 6

Comparison of Regular Classes and Special Classes

School Gains (Years)	Regular Classes						Special Classes					
	Paragraph Meaning	Word Meaning	Spelling	Arithmetic Reasoning	Arithmetic Computation	Battery Median	Paragraph Meaning	Word Meaning	Spelling	Arithmetic Reasoning	Arithmetic Computation	Battery Median
-2.0 -1.7	1		1									
-1.6 -1.3	2		1		2		1					1
-1.2 - .9	7	2	2	2	2	1	1	1	1	3	1	
- .8 - .5	6	6	5	12	4	5	11	7	4	10	7	1
- .4 - .1	30	25	22	37	25	19	39	48	32	34	29	20
0 .3	103	116	129	101	121	114	165	185	183	148	164	187
.4 .7	77	96	87	80	73	111	101	118	131	133	124	157
.8 1.1	51	44	35	43	46	48	90	55	57	80	83	57
1.2 1.5	23	14	12	19	30	5	30	25	18	29	29	16
1.6 1.9	4	4	5	10	8	1	3	2	6	5	4	3
2.0 2.3	1		2		4	2	1	2	4		1	1
2.4 2.7	1		2	1	1		1		2			
2.8 3.1	1		3							1		
Total	307	307	306	305	306	306	443	443	438	443	442	443
Mean	.41	.40	.41	.42	.46	.42	.43	.37	.42	.45	.46	.42
S.D	.58	.45	.58	.56	.56	.40	.51	.46	.48	.49	.47	.39

ONE-YEAR GAINS IN ACHIEVEMENT AND SCHOOL PLACEMENT

Comparison of Special Class and Regular Class Pupils
Group 1 - Special Classes Group 2 - Regular Classes

Table 7

Total Groups

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	443	307	.43	.41	.51	.58	.02	.49
Word Meaning	443	307	.37	.40	.46	.45	-.03	.89
Spelling	438	306	.42	.41	.48	.58	.01	.25
Arithmetic Reasoning	443	305	.45	.42	.49	.56	.03	.76
Arithmetic Computation	442	306	.46	.46	.47	.56	.00	.00
Battery Median	443	306	.42	.42	.39	.40	.00	.00
Average Gain	443	306	.42	.42	.28	.34	.00	.00

Table 8

Boys

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	280	191	.46	.39	.49	.60	.07	1.34
Word Meaning	280	191	.34	.41	.44	.45	-.07	1.67
Spelling	278	191	.38	.38	.46	.59	.00	.00
Arithmetic Reasoning	280	191	.46	.40	.48	.57	.06	1.20
Arithmetic Computation	279	191	.46	.44	.47	.57	.02	.40
Battery Median	280	191	.41	.43	.37	.42	-.02	.53
Average Gain	280	191	.42	.40	.26	.35	.02	.67

Table 9

Girls

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	163	116	.38	.45	.54	.56	-.07	1.04
Word Meaning	163	116	.41	.39	.49	.46	.02	.35
Spelling	160	115	.49	.46	.51	.57	.03	.45
Arithmetic Reasoning	163	114	.44	.44	.50	.53	.00	.00
Arithmetic Computation	163	115	.45	.49	.46	.53	-.04	.65
Battery Median	163	115	.44	.39	.42	.38	.05	1.03
Average Gain	163	115	.43	.46	.31	.33	-.03	.77

ONE-YEAR GAINS IN ACHIEVEMENT AND SCHOOL PLACEMENT

Comparison of Special Class and Regular Class Pupils
Group 1 - Special Classes   Group 2 - Regular Classes

Table 10

White Pupils

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	341	182	.43	.40	.52	.57	.03	.59
Word Meaning	341	182	.38	.43	.48	.46	-.05	1.17
Spelling	336	181	.44	.47	.49	.56	-.03	.61
Arithmetic Reasoning	341	180	.46	.46	.50	.55	.00	.00
Arithmetic Computation	340	181	.48	.44	.46	.55	.04	.84
Battery Median	341	181	.43	.43	.41	.40	.00	.00
Average Gain	341	181	.44	.44	.29	.35	.00	.00

Table 11

Negro Pupils

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	102	125	.43	.44	.47	.60	-.01	.14
Word Meaning	102	125	.30	.37	.39	.44	-.07	1.30
Spelling	102	125	.36	.33	.45	.60	.03	.43
Arithmetic Reasoning	102	125	.42	.35	.45	.56	.07	1.04
Arithmetic Computation	102	125	.39	.49	.47	.57	-.10	1.45
Battery Median	102	125	.37	.40	.30	.41	-.03	.64
Average Gain	102	125	.38	.39	.25	.33	-.01	.26

ONE-YEAR GAINS IN ACHIEVEMENT AND SCHOOL PLACEMENT

Comparison of Special Class and Regular Class Pupils
Group 1 - Special Classes   Group 2 - Regular Classes

Table 12

I.Q. 50-59

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	133	33	.38	.18	.44	.61	.20	1.77
Word Meaning	133	33	.36	17	.45	.41	.19	2.34
Spelling	130	32	.39	.19	.48	.35	.20	2.67
Arithmetic Reasoning	133	31	.46	.17	.47	.49	.29	2.99
Arithmetic Computation	132	32	.42	.41	.48	.58	.01	.09
Battery Median	133	32	.39	.08	.37	.32	.31	4.77
Average Gain	133	32	.38	.21	.27	.30	.17	2.93

Table 13

I.Q. 60-69

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	169	107	.45	.35	.53	.53	.10	1.53
Word Meaning	169	107	.39	.32	.46	.42	.07	1.30
Spelling	168	107	.45	.37	.51	.65	.08	1.08
Arithmetic Reasoning	169	107	.45	.39	.46	.55	.06	.94
Arithmetic Computation	169	107	.44	.38	.44	.56	.06	.94
Battery Median	169	107	.43	.38	.40	.43	.05	.97
Average Gain	169	107	.44	.36	.29	.34	.08	2.02

Table 14

I.Q. 70-79

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	141	165	.46	.49	.53	.59	-.03	.47
Word Meaning	141	165	.35	.50	.47	.45	-.15	2.84
Spelling	140	165	.42	.48	.42	.56	-.06	1.07
Arithmetic Reasoning	141	165	.44	.49	.54	.56	-.05	.79
Arithmetic Computation	141	165	.52	.52	.47	.54	.00	.00
Battery Median	141	165	.43	.51	.38	.36	-.08	1.88
Average Gain	141	165	.43	.50	.28	.33	-.07	2.01

ONE-YEAR GAINS IN ACHIEVEMENT AND SCHOOL PLACEMENT

Comparison of Special Class and Regular Class Pupils
Group 1 - Special Classes   Group 2 - Regular Classes

Table 15

Age 6 - 10 Years

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	129	128	.52	.51	.47	.45	.01	.17
Word Meaning	129	128	.39	.47	.47	.44	-.08	1.41
Spelling	129	127	.45	.50	.47	.55	-.05	.78
Arithmetic Reasoning	129	127	.46	.50	.47	.54	-.04	.63
Arithmetic Computation	129	127	.52	.52	.48	.49	.00	.00
Battery Median	129	127	.48	.51	.39	.38	-.03	.62
Average Gain	129	127	.46	.49	.30	.33	-.03	.76

Table 16

Age 11 - 13 Years

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	207	123	.41	.30	.50	.59	.11	1.73
Word Meaning	207	123	.33	.35	.44	.46	-.02	.39
Spelling	203	123	.42	.37	.51	.55	.05	.82
Arithmetic Reasoning	207	122	.45	.36	.50	.54	.09	1.50
Arithmetic Computation	207	123	.43	.47	.46	.55	-.04	.68
Battery Median	207	123	.40	.34	.37	.36	.06	1.45
Average Gain	207	123	.40	.38	.28	.32	.02	.57

Table 17

Age 14 - 16 Years

	N_1	N_2	M_1	M_2	SD_1	SD_2	D_{1-2}	CR
Paragraph Meaning	107	56	.37	.43	.56	.75	-.06	.53
Word Meaning	107	56	.40	.36	.47	.46	.04	.52
Spelling	106	56	.39	.30	.42	.67	.09	.91
Arithmetic Reasoning	107	56	.44	.35	.49	.59	.09	.98
Arithmetic Computation	106	56	.43	.28	.45	.65	.15	1.54
Battery Median	107	56	.39	.38	.41	.50	.01	.13
Average Gain	107	56	.41	.33	.27	.39	.08	1.37

TABLE 18

EXPECTED GAINS AND ACTUAL GAINS

Months gain in MA (Binet)	Years gain in Achievement	Expected Frequency	Obtained Frequency
	2.2		1
	2.1		1
24	2.0		1
23	1.9		
22	1.8		
21	1.7		
20	1.7		1
19	1.6		3
18	1.5		5
17	1.4		3
16	1.3		
15	1.3		7
14	1.2		6
13	1.1	2	13
12	1.0	3	23
11	.9	2	31
10	.8	14	38
9	.7	85	
8	.7	107	54
7	.6	72	64
6	.5	92	68
5	.4	136	82
4	.3	101	
3	.3	80	82
2	.2	30	65
1	.1	11	53
0	0	5	101
	-.1		21
	-.2		11
	-.3		14
	-.4		3
	-.5		3
	-.6		2
	-.7		1
	-.8		
	-.9		
	-1.0		1
	-1.1		
	-1.2		
	-1.3		
	-1.4		1

Average expected gain .48 years.

Average obtained gain .41 years.

FIG. I

BATTERY MEDIAN GAINS

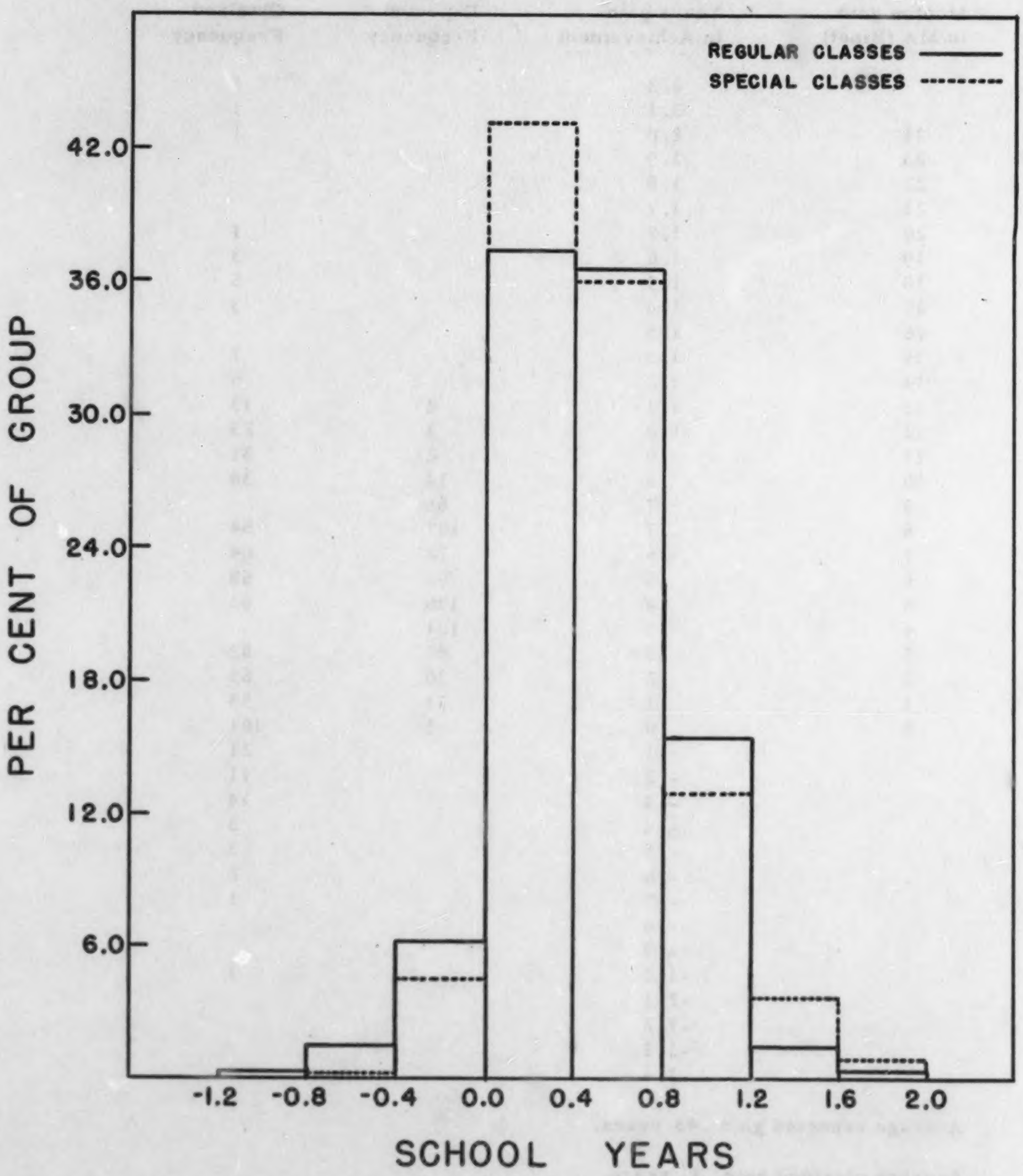


FIG. 2

GAINS IN PARAGRAPH MEANING

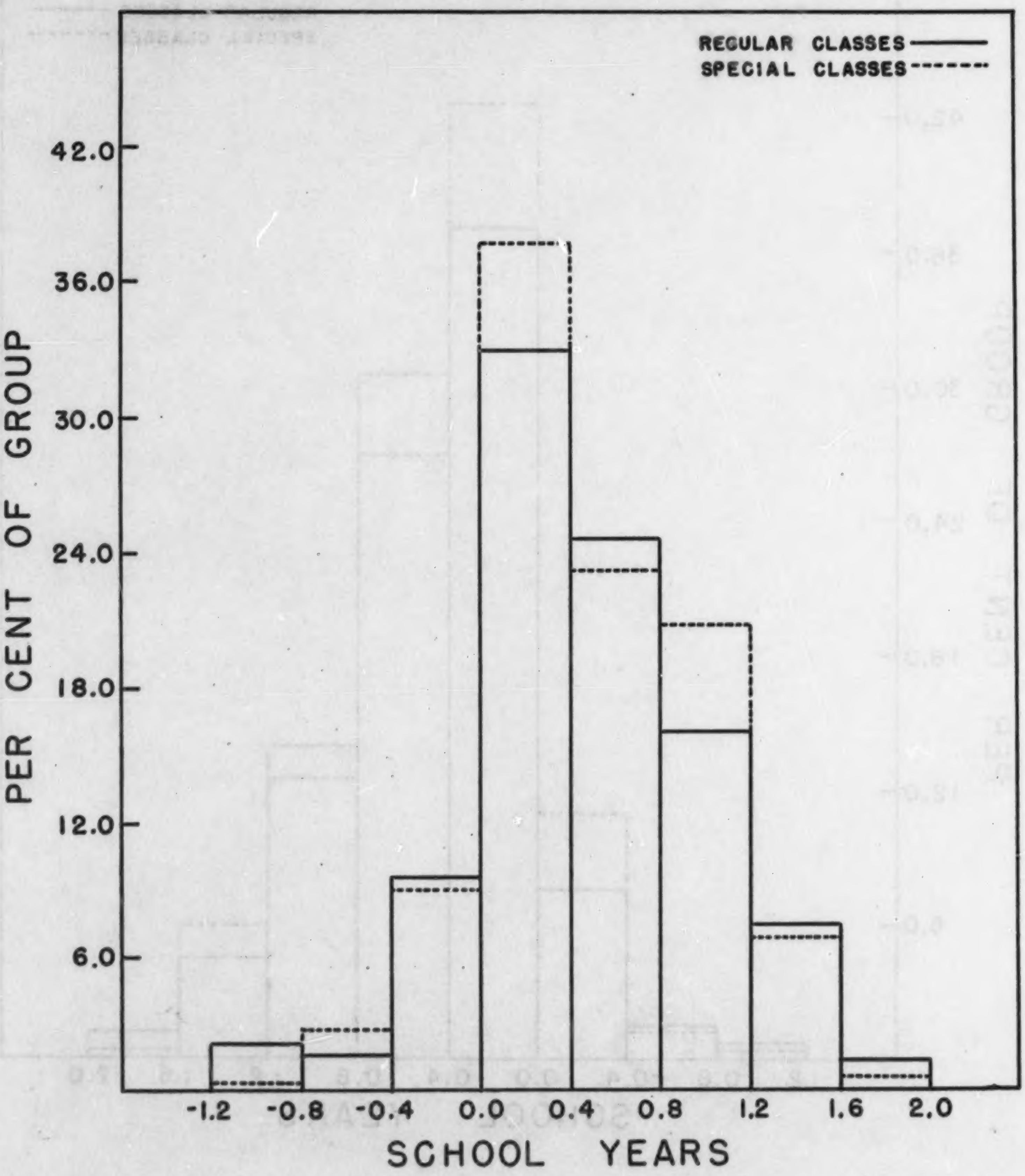


FIG. 3

GAINS IN WORD MEANING

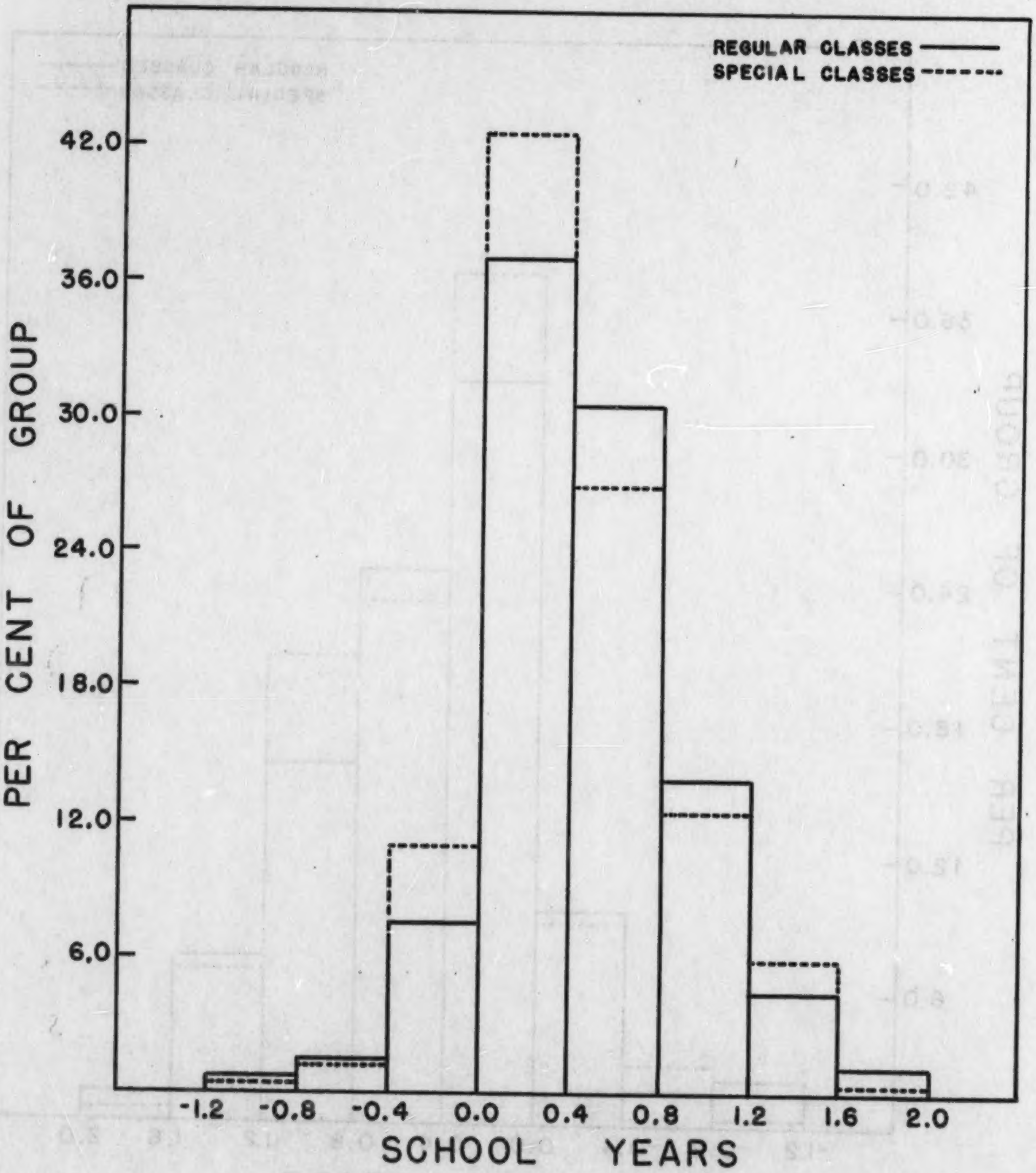


FIG. 4
GAINS IN SPELLING

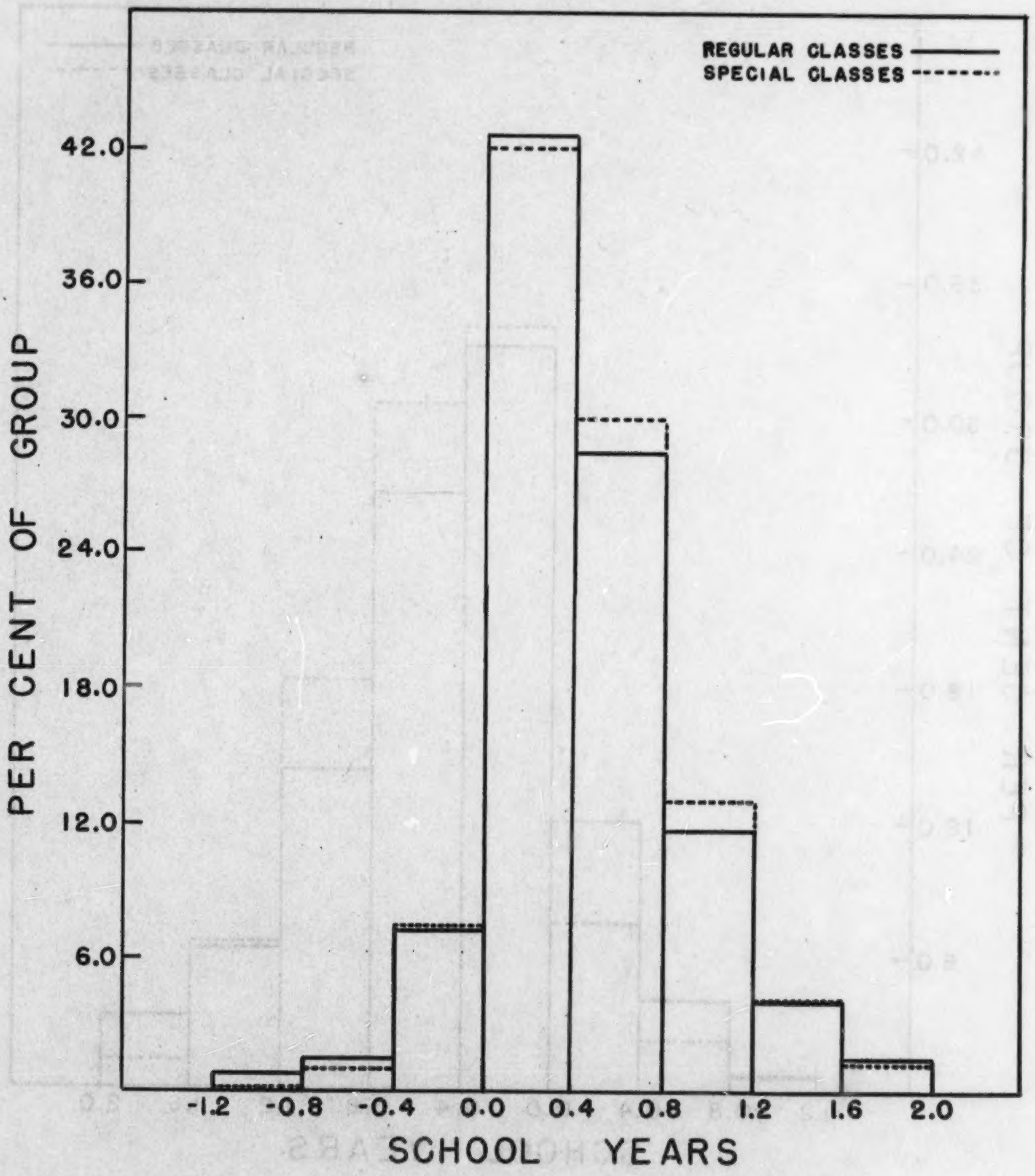


FIG. 5

GAINS IN ARITHMETIC REASONING

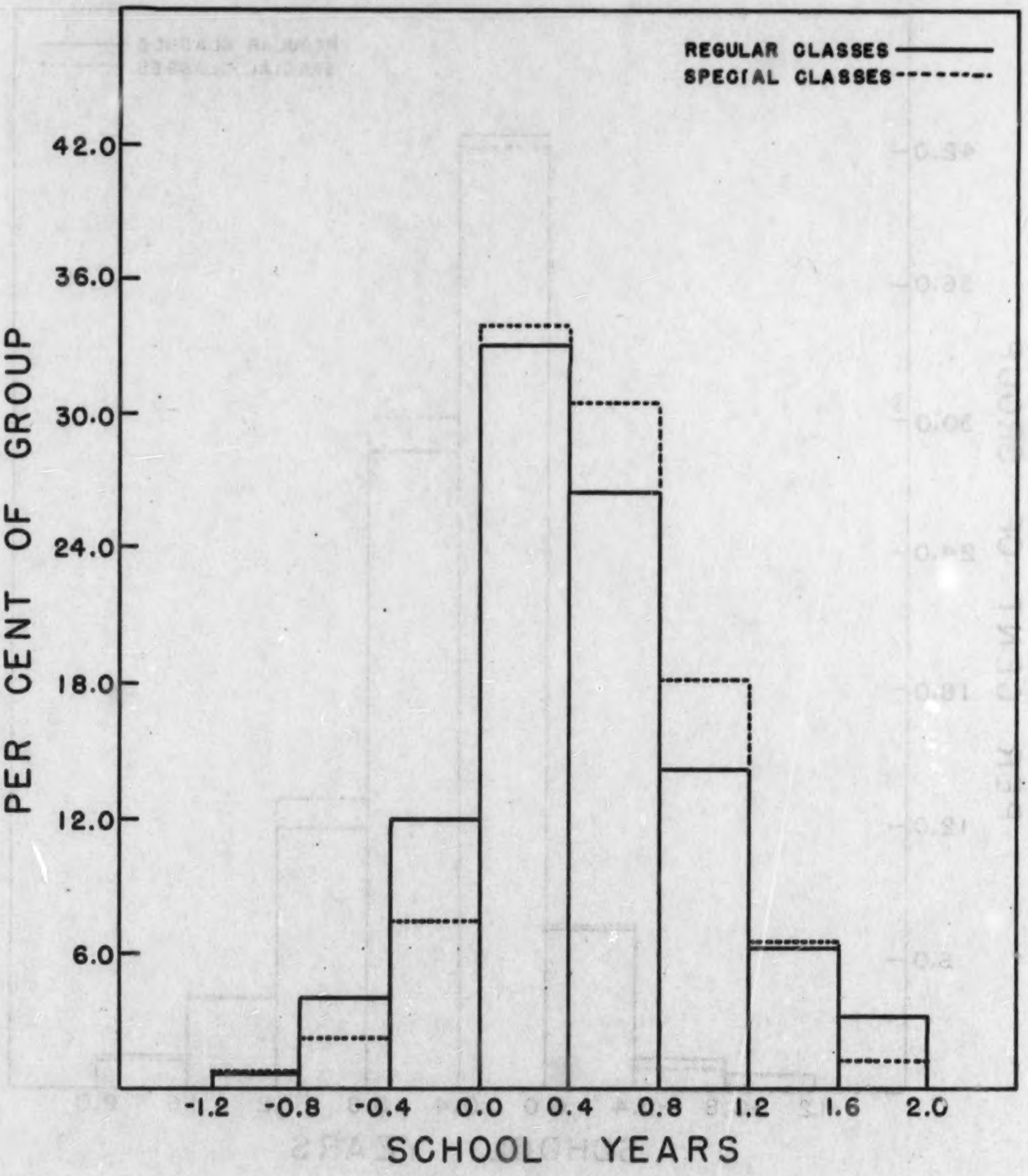


FIG. 6

GAINS IN ARITHMETIC COMPUTATION

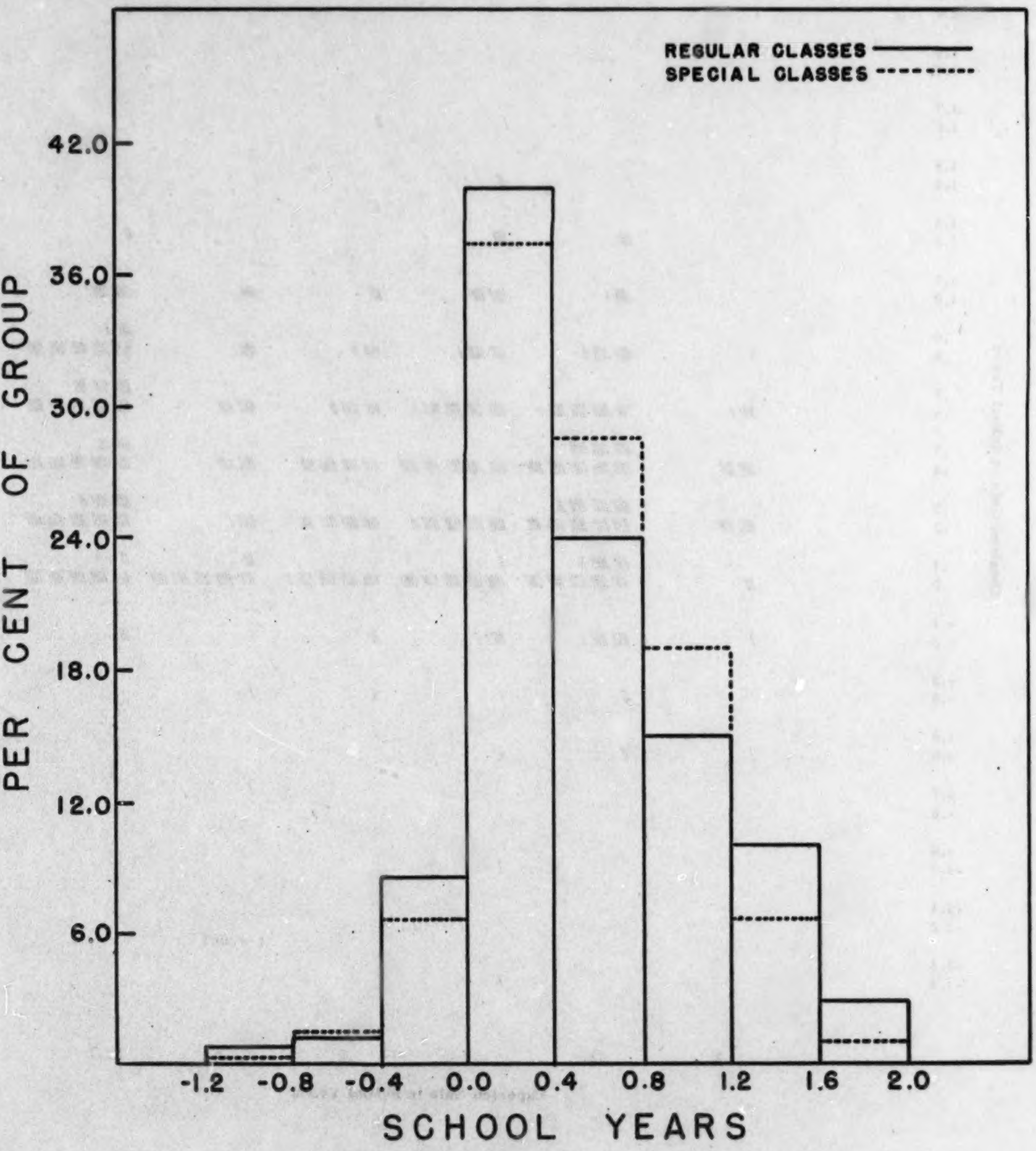
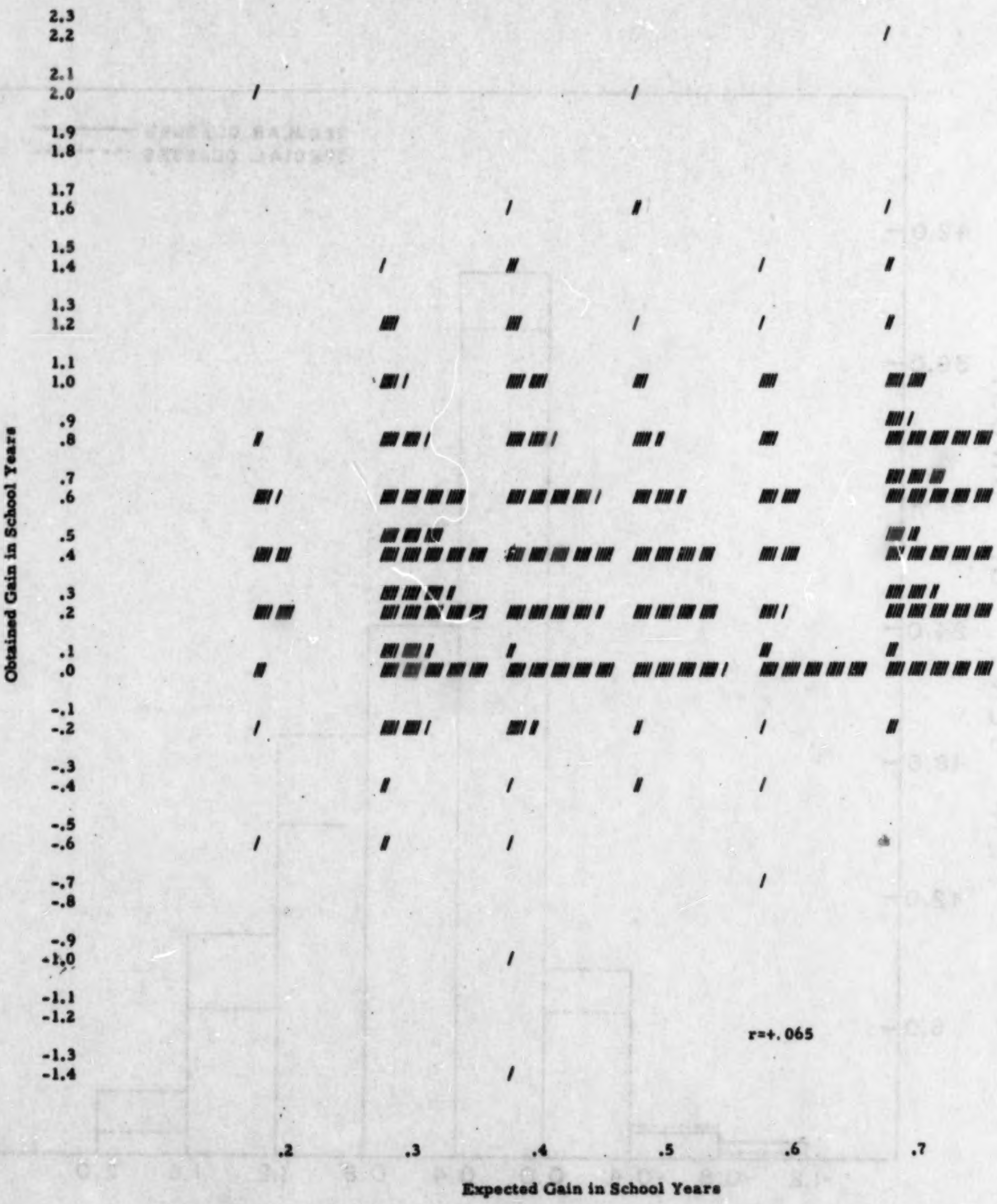


FIGURE 7

COMPARISON OF EXPECTED AND OBTAINED GAINS



SECTION V

INTERACTIONS AMONG THE MAIN VARIABLES

The main effects of each of the variables of sex, race, Binet I. Q., chronological age, and school placement have been reported in earlier sections of this report. In order to determine whether there are any significant interactions among these five main variables the data have been treated by an analysis of variance technique. This computing was done on the International Business Machines 650 computer at the Virginia Polytechnic Institute. The work was supervised by Professor Rolf Bargmann of the Department of Statistics of that institution. The total number of interactions studied is 420, and of these 81 were found to be significant at the .05 level or better. This section of the report will discuss only the significant interactions, and these will be divided under ten separate headings for the ten possible two-way interactions among the five variables.

1. Interaction of Sex and School Placement. Of the 42 interactions of sex and school placement studied, only three were found to be significant. These are only at the .05 level and so indicate that there are not many important interactions of sex and school placement. Tables 1, 2, and 3 show the analysis of variance results for interaction of sex and placement. Table 1 and Table 2 show some interaction on two of the primary mental abilities scores, the quotient in reasoning and the quotient in space. The possible interpretation of the facts of Table 1 where the girls in regular classes have done very much better than the boys in regular classes relative to what the group in special education have done may indicate that the girls who have remained in the regular classes have made somewhat more progress in reading.

Table 2 shows that the girls in special education have an even lower score in the quotients on the space test than might have been expected. The girls usually show a tendency to score lower on the space test than boys do, and the mentally handicapped children, particularly the younger ones, have been shown to be relatively low in space. When these two influences are combined the girls in special education do very poorly in the space test.

Table 3 shows the interaction of sex and school placement on gains in the paragraph meaning section of the Stanford Achievement Test. The boys have a relatively higher gain in special education and the girls have a relatively higher gain in the regular classes. The significance is not extremely high, but is high enough that it should be noted.

2. Interactions of Race and School Placement. Of the 42 interactions studied only five were found to be significant, four at the .05 level, and one at the .01 level. The interactions which are significant are all with various scores on the Stanford Achievement Test or scores derived from the grade placement scores on those tests. The interesting finding here is that there is a greater difference in the performance of Negro children when the special classes are compared with the regular classes than there is for White children when the special classes are compared with the regular classes. Searching for a possible explanation of this finding, the suggestion is offered that possibly only the most extremely retarded Negro children may have been assigned to special education. Actually the intelligence quotients of the total Negro group were not significantly different from those of the White group. It is possible also that the fact that special education had not been installed in the Negro schools quite as early as in the White schools may explain the fact that the special classes for Negroes have not yet been able to accomplish as much as they may.

3. Interactions of School Placement and Binet I.Q. Of the 42 interactions studied twelve are significant, seven at the .05 level and five at the .01 level. The tables showing the significant interactions here are numbered 9 through 20. The tables showing these relations are given below. It will be noticed that the first five refer to the interaction of school placement and Binet I.Q. on several of the

scores on the primary mental abilities test. The factor that seems to be operating here is that the dull children in special education are extremely dull. The spread between the regular and special education group is considerably higher for the lowest one-third of the group when the pupils are arranged in order of intelligence. Tables 13 and 14 show the interaction on the two expectancy scores, which are again dependent upon the Binet and PMA I. Q. 's. The significant fact of these two tables again is the much greater spread between regular and special education students in the group which are low as measured by the Binet I. Q. Tables 15 through 20 show the interaction on certain school achievement scores from the Stanford Achievement Test. The general tendency seems to be for the medium and higher thirds of our group as measured by the I. Q. to do somewhat better in the regular classes than in special classes while the lowest group do better relatively when they are placed in special classes. This may be a matter of the amount of attention which the extremely low group receive in the regular classes and in special classes. They are the groups for whom the regular class teachers can feel very little hope, while the special education teachers can gear their goals and methods to take care of this more severely handicapped group.

Tables 15, 16, 17, and 19 are especially instructive examples of fallacies which may arise from premature interpretation of main effect differences in the presence of significant interactions. The lower margins in these tables appear to indicate a difference in gain of considerable magnitude, as expected on the basis of the theory of constancy of intelligence quotients. A closer look at the two-way tables, however, shows that, in special education classes, all children seem to attain the same (low) gain of about .40 to .45 grade equivalents per year, regardless of their native intelligence. In regular classes, the same is true of the somewhat higher intelligence groups (intermediate and relatively high in our study). It is only the very lowest intelligence groups in the regular education classes whose gain is so atypically low as to influence the entire distribution. This phenomenon which is apparent in four independent achievement measures (Tables 15, 16, 17, and 19) seems to indicate that in the lower ranges of intelligence children perform about equally well (or rather, poorly) regardless of intelligence, except for the very lowest who have not been transferred to special education.

4. Interactions of School Placement and Age. Of the 42 possible significant interactions in this area, thirteen were actually found to be significant. Five of these are significant at the .05 level, four at the .01 level, and four at the .001 level.

Table 21 shows the interaction of these two variables on the quotients in verbal comprehension on the Primary Mental Abilities Test. The young children in special education have not dropped as much here as might have been expected; it must be remembered, however, that the young children took the much simpler form of the test and that the children classified in the middle age group or older more frequently had the section dependent on reading.

In the assignment of children to special classes, children who are able to do some reading are frequently kept in the regular class rooms. This trend is perhaps reflected in Table 21. Table 22 may be influenced by the fact that only those children were given the reasoning part of the test who were able to take the Primary Mental Abilities Test for mental ages 7 to 11. The very much less competent children at all ages had to take the test for mental ages five to seven. This probably accounts for the fact that the scores for special education children in the reasoning quotient are higher than for the children in the regular classes. Tables 23 and 24 show the interaction of placement and age on the expectancy scores.

For the two upper thirds of the group as measured by age, the mental age expectancy of the children is higher for the regular group of students than for the children in special classes. This difference does not obtain for the youngest group. Tables 25 through 33 show the interaction of age and school placement on several of the achievement scores from the Stanford Achievement Test. The general trend is for the children in the two upper age groups to do relatively better in the regular classes than in the special classes. This trend is considerably more marked for the youngest group. In the assignment of young children to special classes only the very slowest intellectually are placed in special education. Schools do not like to assign young children to special classes unless they are so retarded that it is clear that they will accomplish very little in the special classes. It thus happens that the choice of children for special education selects the relatively more dull at the lower age levels.

5. Interactions of Sex and Age. Of the interactions studied seven were found to be significant, two at the .01 level and five at the .001 level. All of the interactions which are significant are of the effect on certain expectancy and achievement variables, mainly actual achievement. The findings here are highly significant, and capable of fairly obvious interpretation. It is clear that as the boys in the mentally handicapped range become older they fall farther and farther short of expectancy. Although the girls show something of the same trend, the difference is much more marked for the boys. It looks as if the older mentally handicapped boys in school give up the possibility of academic achievement, or that their teachers give up the possibility of obtaining educational gains. At any rate the older the boys the more seriously negative their deviations from exceptancy in almost all fields become.

6. Interactions of Race and Age. Five significant interactions are found in this group, four at the .01 level and one at the .001 level. Table 41 shows a

rather surprising difference in favor of the Negro children in the youngest third of the group. This should be taken with some degree of caution, however, since there are only eleven children represented in that cell of the table. As we have commented before there is a definite tendency among the White schools at any rate not to assign young children to special education groups unless they are distinctly dull.

All of the significant interactions here are on some form of mental test score, most of them the various parts of the Primary Mental Abilities Test. In administering the test the primary form that is for children with mental ages five to seven was administered to the young children and to the duller old ones. For the most part children who could not read at all were given this form of the test. The form for mental ages seven to eleven was administered to the ones who seemed to be capable of taking the test or who had received ceiling scores on the more elementary form. This factor of selection seems to be operating to produce the interactions observed in these tables. Since the average score of the Negro children in the oldest group sometimes run higher than we might have expected, we are offering the possible explanation that the duller and older Negro children more frequently drop out of school, either at the schools' initiative or the families' initiative. Perhaps many of these children in North Carolina are able to secure farm jobs.

7. Interactions of Binet I. Q. and Age. In the study of these reactions we find the largest number of significant tables. Six of the interactions are significant at the .05 level, four at the .01 level, and seven at the .001 level. Tables 46 through 50 show the influence on other measures of intelligence. This is not surprising because both age and the Binet level of intelligence of a child influence his score on any measure of intelligence. This is shown rather clearly in the first five tables in this group. The other tables deal with the influence of intelli-

gence and age on scores in the various achievement measures. It is a distressing fact born out here with more emphasis than in the main relations previously studied that as we work with older and relatively less retarded groups of mentally handicapped children their school achievement goes down and their deviations from expectancy increase disproportionately. It is hard to interpret this result in any way which is not unfavorable to the way these children are being handled in school. It would certainly seem that as we work with brighter children or with older children or with children who are both brighter and older we should be getting better results in the school achievement testing. The tables in this section of the report show clearly that just the opposite is true.

8. Interaction of Sex and Binet I. Q. Out of 42 possible interactions, six in this group are significant, three at the five per cent level and three at the one per cent level. An examination of the tables reveals that the main affects are that girls do better than boys and that the less intelligent subgroups of this total group of the mentally handicapped do relatively better than their somewhat brighter classmates. Above these main effects there is interaction between sex and intelligence. It is clearly the brighter boys who do less well in school. Only one of these six charts refers to one of the Primary Mental Abilities, and that ability is *verbal comprehension in words. This clearly is a factor which is influenced some -* what by reading. There seems to be a fair indication all through the study that girls are somewhat more adaptable to the classroom situation whether it is the regular class or the special class. The interaction described here and illustrated by the tables is a most unfortunate one. We should hope that our brighter children did relatively better than their less intelligent classmates.

9. Interaction of Race and Binet I. Q. There are twelve significant interactions here, six at the five per cent level, three at the .01 level, and three at the .001 level.

The interactions of the factors of race and Binet Test scores with the other intelligence measures are highly significant. The principal explanation or finding seems to be that the Whites showed extremely much more variability than the Negro students. The other tables which deal with the interaction of race and Binet rating on the various achievement measures indicate that in addition to the trends for White children in general to do slightly better than Negro children and for the children with higher intelligence to fall farther short of their expectancy than their somewhat more retarded classmates. There is an interaction by which the brighter of the White groups fall farther short of their expectations than would be expected from the average trend of the whole group. It is hard to explain such an interaction except in terms of the acceptance of the mentally handicapped child by the White teacher and by the other White groups with whom he is associated. Perhaps the border line cases are more aware of their deficiencies and stop trying as a protection against being interpreted as unable to learn. These are of course suppositions, but the fact itself is highly interesting.

10. Interaction of Race and Sex. Only one significant interaction was discovered here: the influence of race and sex combined on average gains made by the child in a year. There seems to be no significant difference in the main trends for either race or sex but the Negro boys show a lower gain than any of the other three groups.

It will be noted that there are very few significant interactions in ratio scores. This is due to the fact that the mean-square error, even after elimination of all five main effects, is still of the order of .1076 (Battery Median) to .1853 (Spelling). This corresponds to a standard deviation of .30 to .40 even within the 72 groups. If the tabulations for ratio scores in the first and second achievement testing are examined, it will be noticed that there is extreme variation in the ratio scores. The ratio scores were obtained by dividing the child's actual achievement by his expected achievement. In many cases the actual achievement was zero, as measured by the Stanford Achievement Test. Some of the children had such low mental ages that the expected score was zero. No ratios were figured for expectancy scores of less than five-tenths of a year, but even so the ratio scores showed great variability.

INTERACTION OF SEX AND SCHOOL PLACEMENT

Table 1
Quotient Scores in Reasoning (PMA)

Sex		Male	Female	Total
School Placement	Regular	63.0 (124)*	66.9 (74)	64.4 (198)
	Special	62.9 (245)	63.3 (136)	63.0 (381)
	Total	62.9 (369)	64.5 (210)	
		F 4.2	1; 575 d.f.	Sig. .05

Table 2
Quotient Scores in Spatial Thinking (PMA)

Sex		Male	Female	Total
School Placement	Regular	65.8 (199)	65.0 (115)	65.5 (314)
	Special	63.5 (513)	58.3 (296)	61.6 (809)
	Total	64.1 (712)	60.2 (411)	
		F 4.0	1;1119 d.f.	Sig. .05

Table 3
Gains in Paragraph Meaning Scores (SAT)

Sex		Male	Female	Total
School Placement	Regular	.337 (129)	.463 (79)	.385 (208)
	Special	.460 (341)	.380 (199)	.431 (540)
	Total	.426 (470)	.404 (278)	
		F 4.8	1; 744 d.f.	Sig. .05

*Numbers in parentheses show number of cases.

INTERACTION OF RACE AND PLACEMENT

Table 4
Grade Scores in Paragraph Meaning (SAT)

Race		White	Negro	Total
School Placement	Regular	2.34 (207)*	2.57 (137)	2.43 (344)
	Special	2.02 (686)	1.82 (223)	1.97 (909)
	Total	2.09 (893)	2.11 (360)	
		F 7.1	1; 1249 d.f.	Sig. .01

Table 5
Ratio Scores in Paragraph Meaning (SAT)

Race		White	Negro	Total
School Placement	Regular	.824 (187)	.987 (121)	.888 (308)
	Special	.715 (650)	.745 (214)	.723 (864)
	Total	.739 (837)	.833 (335)	
		F 5.3	1; 1168 d.f.	Sig. .05

Table 6
Grade Scores in Word Meaning (SAT)

Race		White	Negro	Total
School Placement	Regular	2.36 (207)	2.54 (137)	2.43 (344)
	Special	2.13 (688)	1.97 (223)	2.09 (911)
	Total	2.19 (895)	2,19 (360)	
		F 4.4	1; 1251 d.f.	Sig. .05

Table 7
Grade Scores in Spelling (SAT)

Race		White	Negro	Total
School Placement	Regular	2.55 (206)	2.80 (137)	2.65 (343)
	Special	2.26 (694)	2.02 (2.23)	2.20 (917)
	Total	2.33 (900)	2.32 (360)	
		F 6.3	1; 1256 d.f.	Sig. .05

*Numbers in parentheses show number of cases.

INTERACTION OF RACE AND PLACEMENT

Table 8
Ratio Scores in Spelling (SAT)

Race		White	Negro	Total
School Placement	Regular	.884 (187)	1.078 (121)	.960 (308)
	Special	.799 (657)	.820 (214)	.804 (871)
	Total	.817 (844)	.913 (335)	
		F 6.2	1; 1175 d.f.	Sig. .05

INTERACTION OF SCHOOL PLACEMENT AND BINET I. Q.

Table 9
Quotient Scores in Non-Reading Scores (PMA)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	62. 3 (100)*	68. 3 (116)	73. 9 (119)	68. 5 (335)
	Special	56. 0 (292)	64. 9 (309)	71. 1 (265)	63. 8 (866)
	Total	57. 6 (392)	65. 9 (425)	72. 0 (384)	
		F 5. 6	2; 1195 d. f.	Sig. .01	

Table 10
Quotient Scores in Verbal Comprehension (PMA)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	62. 2 (105)	67. 5 (108)	71. 7 (120)	67. 3 (333)
	Special	55. 4 (268)	62. 8 (268)	68. 4 (278)	62. 3 (814)
	Total	57. 4 (373)	64. 2 (376)	69. 4 (398)	
		F 4. 1	2; 1141 d. f.	Sig. .05	

Table 11
Quotient Scores in Numerical Thinking (PMA)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	65. 2 (104)	71. 0 (106)	76. 0 (118)	71. 0 (328)
	Special	57. 1 (269)	67. 9 (274)	72. 5 (285)	66. 0 (828)
	Total	59. 4 (373)	68. 8 (380)	73. 5 (403)	
		F 4. 4	2; 1150 d. f.	Sig. .05	

Table 12
Quotient Scores in Spatial Thinking (PMA)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	60. 0 (96)	66. 7 (103)	69. 1 (115)	65. 5 (314)
	Special	51. 5 (263)	64. 0 (270)	68. 9 (276)	61. 6 (809)
	Total	53. 7 (359)	64. 7 (373)	69. 0 (391)	
		F 6. 8	2; 1117 d. f.	Sig. .01	

*Numbers in parentheses show number of cases.

INTERACTION OF SCHOOL PLACEMENT AND BINET I. Q.

Table 13
Binet MA Grade Expectancy

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	2. 14 (100)	3. 05 (117)	3. 44 (124)	2. 93 (341)
	Special	1. 92 (291)	2. 89 (319)	3. 80 (302)	2. 88 (912)
	Total	1. 97 (391)	2. 93 (436)	3. 70 (426)	
		F 6. 5.	2; 1247 d. f.	Sig. . 01	

Table 14
PMA Grade Expectancy

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	2. 50 (97)	3. 12 (112)	3. 43 (117)	3. 05 (326)
	Special	1. 93 (278)	2. 98 (304)	3. 61 (265)	2. 83 (847)
	Total	2. 08 (375)	3. 02 (416)	3. 55 (382)	
		F 5. 7	2; 1167 d. f.	Sig. . 01	

Table 15
Gains in Battery Median Score (SAT)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	. 247 (64)	. 471 (77)	. 476 (67)	. 404 (208)
	Special	. 404 (187)	. 391 (184)	. 461 (168)	. 417 (539)
	Total	. 364 (251)	. 414 (261)	. 465 (235)	
		F 3. 9	2; 741 d. f.	Sig. . 05	

Table 16
Average Gains in Achievement (SAT)

	Binet I. Q.	Low	Middle	High	Total
School Placement	Regular	. 261 (64)	. 455 (77)	. 466 (67)	. 399 (208)
	Special	. 411 (187)	. 421 (184)	. 454 (168)	. 428 (539)
	Total	. 373 (251)	. 431 (261)	. 457 (235)	
		F 3. 9	2; 741 d. f.	Sig. . 05	

INTERACTION OF SCHOOL PLACEMENT AND BINET I. Q.

Table 17
Gains in Word Meaning Scores (SAT)

Binet I. Q.		Low	Middle	High	Total
School Placement	Regular	.205 (64)	.427 (77)	.473 (67)	.374 (208)
	Special	.389 (189)	.351 (184)	.392 (168)	.377 (540)
	Total	.342 (252)	.373 (261)	.415 (235)	
		F 4.3	2; 742 d. f.	Sig. .05	

Table 18
Deviation Scores in Arithmetic Reasoning (SAT)

Binet I. Q.		Low	Middle	High	Total
School Placement	Regular	-.11 (99)	-.56 (116)	- .66 (122)	-.47 (337)
	Special	-.27 (284)	-.69 (314)	-1.14 (300)	-.71 (898)
	Total	-.23 (383)	-.65 (430)	-1.00 (422)	
		F 3.7	2; 1229 d. f.	Sig. .05	

Table 19
Gains in Arithmetic Reasoning Scores (SAT)

Binet I. Q.		Low	Middle	High	Total
School Placement	Regular	.225 (64)	.491 (77)	.451 (67)	.396 (208)
	Special	.429 (186)	.415 (184)	.475 (168)	.438 (538)
	Total	.376 (250)	.437 (261)	.468 (235)	
		F 3.2	2; 740 d. f.	Sig. .05	

Table 20
Deviation Scores in Arithmetic Computation (SAT)

Binet I. Q.		Low	Middle	High	Total
School Placement	Regular	.15 (100)	-.22 (116)	-.31 (122)	-.14 (338)
	Special	.23 (285)	-.13 (314)	-.62 (300)	-.18 (899)
	Total	.21 (385)	-.16 (430)	-.53 (422)	
		F 4.9	2; 1231 d. f.	Sig. .01	

INTERACTION OF SCHOOL PLACEMENT AND AGE

Table 21
Quotient Scores in Verbal Comprehension (PMA)

Age		Younger	Middle	Older	Total
School Placement	Regular	67.6 (134)*	67.8 (80)	66.7 (119)	67.3 (333)
	Special	65.0 (216)	61.7 (268)	61.0 (330)	62.3 (814)
	Total	66.0 (350)	63.1 (348)	62.5 (449)	
		F 3.8	2; 1141 d.f.	Sig. .05	

Table 22
Quotient Scores in Reasoning - Figures (PMA)

Age		Younger	Middle	Older	Total
School Placement	Regular	68.6 (25)	62.2 (61)	66.8 (112)	65.6 (198)
	Special	73.2 (22)	71.4 (120)	65.7 (262)	67.8 (404)
	Total	70.7 (47)	68.3 (181)	66.1 (374)	
		F 6.8	2; 596 d.f.	Sig. .01	

Table 23
Binet MA Grade Expectancy

Age		Younger	Middle	Older	Total
School Placement	Regular	1.58 (136)	3.12 (81)	4.27 (124)	2.93 (341)
	Special	1.72 (244)	2.76 (300)	3.75 (368)	2.88 (912)
	Total	1.67 (380)	2.84 (381)	3.88 (492)	
		F 11.5	2; 1247 d.f.	Sig. .001	

Table 24
PMA Grade Expectancy

Age		Younger	Middle	Older	Total
School Placement	Regular	1.62 (127)	3.26 (79)	4.42 (1.20)	3.05 (326)
	Special	1.58 (211)	2.66 (283)	3.71 (353)	2.83 (847)
	Total	1.60 (338)	2.79 (362)	3.89 (473)	
		F 7.4	2; 1167 d.f.	Sig. .001	

*Numbers in parentheses show number of cases.

INTERACTION OF SCHOOL PLACEMENT AND AGE

Table 25
Battery Median Grade Scores (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.68 (139)	2.55 (81)	3.35 (124)	2.48 (344)
	Special	1.38 (252)	2.11 (3.00)	2.70 (3.68)	2.15 (920)
	Total	1.48 (391)	2.20 (381)	2.86 (492)	
		F 3.2	2; 1258 d.f.	Sig. .05	

Table 26
Ratio Scores in Battery Median (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.048 (104)	.852 (80)	.815 (124)	.903 (308)
	Special	.840 (207)	.792 (298)	.750 (367)	.786 (872)
	Total	.909 (311)	.805 (378)	.766 (491)	
		F 3.7	2; 1174 d.f.	Sig. .05	

Table 27
Deviation Scores in Paragraph Meaning (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	.23 (133)	-.73 (81)	-1.08 (124)	-.48 (338)
	Special	-.48 (226)	-.82 (296)	-1.27 (365)	-.92 (887)
	Total	-.22 (359)	-.80 (377)	-1.22 (489)	
		F 5.4	2; 1219 d.f.	Sig. .01	

Table 28
Ratio Scores inParagraph Meaning (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.099 (104)	.800 (80)	.768 (124)	.888 (308)
	Special	.765 (205)	.740 (294)	.685 (365)	.723 (864)
	Total	.878 (309)	.753 (374)	.706 (489)	
		F 9.9	2; 1166 d.f.	Sig. .001	

INTERACTION OF SCHOOL PLACEMENT AND AGE

Table 29
Deviation Scores in Word Meaning (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	.21 (133)	-.69 (81)	-1.10 (124)	-.49 (338)
	Special	-.29 (226)	-.70 (297)	-1.16 (366)	-.79 (889)
	Total	-.11 (359)	-.70 (378)	-1.15 (490)	
		F 3.8	2; 1221 d.f.	Sig. .05	

Table 30
Ratio Scores in Word Meaning (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.116 (104)	.832 (80)	.765 (124)	.901 (308)
	Special	.876 (206)	.782 (295)	.719 (365)	.778 (866)
	Total	.957 (310)	.793 (375)	.731 (489)	
		F 5.2	2; 1168 d.f.	Sig. .01	

Table 31
Grade Scores in Spelling (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.76 (138)	2.73 (81)	3.59 (124)	2.65 (343)
	Special	1.45 (251)	2.13 (299)	2.78 (367)	2.20 (917)
	Total	1.56 (389)	2.26 (380)	2.98 (491)	
		F 3.9	2; 1254 d.f.	Sig. .05	

Table 32
Grade Scores in Arithmetic Reasoning (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.48 (138)	2.50 (81)	3.51 (124)	2.46 (343)
	Special	1.32 (252)	2.12 (300)	2.78 (368)	2.17 (920)
	Total	1.38 (390)	2.21 (381)	2.97 (492)	
		F 8.0	2; 1257 d.f.	Sig. .001	

INTERACTION OF SCHOOL PLACEMENT AND AGE

Table 33
Grade Scores in Arithmetic Computation (SAT)

Age		Younger	Middle	Older	Total
School Placement	Regular	1.78 (139)	2.84 (81)	3.83 (124)	2.77 (344)
	Special	1.78 (252)	2.64 (300)	3.36 (367)	2.69 (919)
	Total	1.78 (391)	2.68 (381)	3.48 (491)	
		F 4.6	2; 1257 d.f.	Sig. .01	

INTERACTION OF SEX AND AGE

Table 34
Binet MA Grade Expectancy

Age		Younger	Middle	Older	Total
Sex	Male	1.66 (226)*	2.90 (238)	4.02 (321)	3.00 (785)
	Female	1.68 (154)	2.73 (143)	3.61 (171)	2.71 (468)
	Total	1.67 (380)	2.84 (381)	3.88 (492)	
		F 4.66	2; 1247 d.f.	Sig. .01	

Table 35
Deviation Scores in Battery Median (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	-.25 (217)	-.83 (238)	-1.28 (321)	-.85 (776)
	Female	-.05 (145)	-.31 (143)	- .51 (171)	-.30 (459)
	Total	-.17 (362)	-.63 (381)	-1.01 (492)	
		F 9.7	2; 1229 d.f.	Sig. .001	

Table 36
Deviation Scores in Paragraph Meaning (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	-.28 (214)	-1.05 (236)	-1.54 (319)	-1.04 (769)
	Female	-.12 (145)	- .40 (141)	- .63 (170)	- .40 (456)
	Total	-.22 (359)	- .80 (377)	-1.22 (489)	
		F 13.6	2; 1219 d.f.	Sig. .001	

Table 37
Deviation Scores in Word Meaning (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	-.19 (214)	-.92 (236)	-1.44 (319)	-.93 (769)
	Female	.03 (145)	-.32 (142)	- .60 (171)	-.32 (458)
	Total	-.11 (359)	-.70 (378)	-1.15 (490)	
		F 8.9	2; 1221 d.f.	Sig. .001	

*Numbers in parentheses show number of cases

Table 38
Deviation Scores in Spelling (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	-.24 (216)	-.90 (238)	-1.27 (320)	-.87 (774)
	Female	.14 (144)	-.08 (142)	- .20 (171)	-.06 (457)
	Total	-.09 (360)	-.60 (380)	- .90 (491)	
		F 8.2	2; 1225 d.f.	Sig. .001	

Table 39
Deviation Scores in Arithmetic Reasoning (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	-.32 (216)	-.73 (238)	-1.10 (321)	-.77 (775)
	Female	-.24 (146)	-.46 (143)	- .55 (171)	-.42 (460)
	Total	-.29 (362)	-.63 (381)	- .91 (492)	
		F 7.3	2; 1229 d.f.	Sig. .001	

Table 40
Deviation Scores in Arithmetic Computation (SAT)

Age		Younger	Middle	Older	Total
Sex	Male	.15 (218)	-.23 (238)	-.55 (320)	-.25 (776)
	Female	.13 (147)	-.04 (143)	-.16 (171)	-.03 (461)
	Total	.14 (365)	-.16 (381)	-.41 (491)	
		F 5.4	2; 1231 d.f.	Sig. .01	

INTERACTION OF RACE AND AGE

Table 41
Quotients in PMA Total

Age		Younger	Middle	Older	Total
Race	White	75.6 (20)*	72.7 (97)	65.7 (231)	68.2 (348)
	Negro	79.6 (11)	68.4 (50)	66.3 (89)	68.0 (150)
	Total	77.0 (31)	71.3 (147)	65.8 (320)	
		F 11.3	2; 492 d.f.	Sig. .001	

Table 42
Quotients in PMA Non-Reading Total

Age		Younger	Middle	Older	Total
Race	White	67.2 (246)	66.0 (244)	63.4 (366)	68.2 (348)
	Negro	67.8 (120)	62.2 (118)	64.4 (107)	68.0 (150)
	Total	67.4 (366)	64.8 (362)	63.6 (473)	
		F 6.7	2; 1195 d.f.	Sig. .01	

Table 43
Quotient Scores in Verbal Comprehension (PMA)

Age		Younger	Middle	Older	Total
Race	White	66.0 (241)	63.9 (243)	61.9 (344)	63.7 (828)
	Negro	66.0 (109)	61.3 (105)	64.2 (105)	63.9 (319)
	Total	66.0 (350)	63.1 (348)	62.5 (449)	
		F 6.0	2; 1141 d.f.	Sig. .01	

Table 44
Quotient Scores in Reasoning (PMA)

Age		Younger	Middle	Older	Total
Race	White	70.9 (30)	66.8 (125)	60.1 (271)	62.9 (426)
	Negro	78.8 (11)	65.3 (50)	63.6 (92)	65.3 (153)
	Total	73.0 (41)	66.4 (175)	61.0 (363)	
		F 6.5	2; 573 d.f.	Sig. .01	

* Numbers in parentheses show number of cases.

INTERACTION OF RACE AND AGE

Table 45
Quotient Scores in Reasoning - Words (PMA)

Age		Younger	Middle	Older	Total
Race	White	69.9 (28)	67.5 (101)	59.7 (23.6)	62.6 (265)
	Negro	76.2 (11)	65.1 (43)	61.2 (85)	63.6 (139)
	Total	71.7 (39)	66.7 (144)	60.1 (321)	
		F 5.9	2; 498	Sig. .01	

INTERACTION OF BINET I.Q. AND AGE

Table 46
Binet MA Grade Expectancy

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	1.09 (108)*	1.85 (124)	2.67 (159)	1.97 (391)
	Middle	1.68 (130)	2.93 (129)	3.85 (177)	2.93 (436)
	High	2.11 (142)	3.70 (128)	5.15 (156)	3.70 (426)
	Total	1.67 (380)	2.84 (381)	3.88 (492)	
	F 50	4; 1244 d.f.	Sig. .001		

Table 47
PMA Grade Expectancy

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	1.14 (98)	1.89 (120)	2.80 (157)	2.08 (375)
	Middle	1.64 (120)	2.92 (124)	4.05 (172)	3.02 (416)
	High	1.93 (120)	3.58 (118)	4.90 (144)	3.56 (382)
	Total	1.60 (338)	2.79 (362)	3.89 (473)	
	F 15.1	4; 1164 d.f.	Sig. .001		

Table 48
Quotient Scores in Verbal Comprehension (PMA)

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	59.8 (105)	55.9 (117)	56.8 (151)	57.4 (373)
	Middle	66.1 (114)	63,0 (112)	63.5 (150)	64.2 (376)
	High	70.9 (131)	70.3 (119)	67.3 (148)	69.4 (398)
	Total	66.0 (350)	63.1 (348)	62.5 (449)	
	F 2.6	4; 1138 d.f.	Sig. .05		

*Numbers in parentheses show number of cases

INTERACTION OF BINET I.Q. AND AGE

Table 49
Quotient Scores in Reasoning - Words (PMA)

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	70.1 (7)	64.9 (17)	58.3 (73)	60.3 (97)
	Middle	74.8 (12)	64.2 (47)	59.9 (120)	62.0 (179)
	High	70.4 (20)	68.6 (80)	61.3 (128)	64.7 (228)
	Total	71.7 (39)	66.7 (144)	60.1 (321)	
	F 2.5	4; 495 d.f.	Sig. .05		

Table 50
Quotient Scores in Spatial Thinking (PMA)

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	55.5 (104)	52.4 (113)	53.6 (142)	53.7 (359)
	Middle	62.0 (114)	64.0 (109)	67.3 (150)	64.7 (373)
	High	63.7 (129)	71.1 (111)	71.8 (151)	69.0 (391)
	Total	60.7 (347)	62.4 (333)	64.4 (443)	
	F 5.6	4; 1114 d.f.	Sig. .001		

Table 51
Battery Median Grade Scores (SAT)

Age		Younger	Middle	Older	Total
Binet I.Q.	Low	1.23 (116)	1.70 (124)	2.29 (159)	1.80 (399)
	Middle	1.53 (133)	2.31 (129)	2.88 (177)	2.30 (439)
	High	1.66 (142)	2.59 (128)	3.43 (156)	2.59 (426)
	Total	1.48 (391)	2.20 (381)	2.86 (492)	
	F 6.0	4; 1255 d.f.	Sig. .001		

INTERACTION OF BINET I. Q. AND AGE

Table 52
Deviation Scores in Battery Median (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.21 (100)	- .15 (124)	- .36 (159)	- .15 (383)
	Middle	-.15 (124)	- .62 (129)	- .97 (177)	- .63 (430)
	High	-.47 (138)	-1.11 (128)	-1.73 (156)	-1.13 (422)
	Total	-.17 (362)	- .63 (381)	-1.01 (492)	
	F 4.61	4; 1226 d.f.	Sig. .001		

Table 53
Grade Scores in Paragraph Meaning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	1.22 (115)	1.63 (123)	2.11 (159)	1.70 (397)
	Middle	1.50 (130)	2.22 (126)	2.69 (174)	2.19 (430)
	High	1.57 (142)	2.30 (128)	3.18 (156)	2.38 (426)
	Total	1.44 (387)	2.05 (377)	2.66 (489)	
	F 5.5.	4; 1244 d.f.	Sig. .001		

Table 54
Deviation Scores in Paragraph Meaning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.19 (99)	- .26 (123)	- .54 (159)	- .26 (381)
	Middle	-.18 (122)	- .73 (126)	-1.17 (174)	- .75 (422)
	High	-.55 (138)	-1.40 (128)	-1.97 (156)	-1.33 (422)
	Total	-.22 (359)	- .80 (377)	-1.22 (489)	
	F 3.7	4; 1216 d.f.	Sig. .01		

INTERACTION OF BINET I. Q. AND AGE

Table 55
Grade Scores in Word Meaning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	1.28 (115)	1.73 (123)	2.18 (159)	1.78 (397)
	Middle	1.59 (130)	2.26 (127)	2.77 (175)	2.27 (432)
	High	1.72 (142)	2.42 (128)	3.23 (156)	2.49 (426)
	Total	1.55 (387)	2.14 (378)	2.73 (490)	
		F 3.82	4; 1246 d.f.	Sig. .01	

Table 56
Deviation Scores in Word Meaning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.27 (99)	- .12 (123)	- .47 (159)	- .17 (381)
	Middle	-.07 (122)	- .66 (127)	-1.08 (175)	- .66 (424)
	High	-.41 (138)	-1.29 (128)	-1.91 (156)	-1.23 (422)
	Total	-.11 (359)	- .69 (378)	-1.15 (490)	
		F 4.6	4; 1218 d.f.	Sig. .01	

Table 57
Grade Scores in Spelling (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	1.26 (116)	1.76 (124)	2.44 (159)	1.89 (399)
	Middle	1.67 (131)	2.38 (129)	3.00 (176)	2.42 (436)
	High	1.71 (142)	2.61 (127)	3.51 (156)	2.64 (425)
	Total	1.56 (389)	2.26 (380)	2.98 (491)	
		F 2.7	4; 1251 d.f.	Sig. .05	

INTERACTION OF BINET I. Q. AND AGE

Table 58
Deviation Scores in Spelling (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.25 (100)	- .14 (124)	- .21 (159)	- .07 (383)
	Middle	-.01 (122)	- .55 (129)	- .88 (176)	- .53 (427)
	High	-.41 (138)	-1.09 (127)	-1.64 (156)	-1.07 (421)
	Total	-.09 (360)	- .60 (380)	- .90 (491)	
		F 3.3	4; 1222 d.f.	Sig. .05	

Table 59
Grade Scores in Arithmetic Reasoning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	1.07 (115)	1.59 (124)	2.28 (159)	1.71 (398)
	Middle	1.43 (133)	2.28 (129)	2.91 (177)	2.28 (439)
	High	1.58 (142)	2.72 (128)	3.73 (156)	2.71 (426)
	Total	1.38 (390)	2.21 (381)	2.97 (492)	
		F 11.9	4; 1254 d.f.	Sig. .001	

Table 60
Deviation Scores in Arithmetic Reasoning (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.02 (100)	-.26 (124)	- .36 (159)	- .23 (383)
	Middle	-.25 (124)	-.64 (129)	- .95 (177)	- .65 (430)
	High	-.54 (138)	-.98 (128)	-1.42 (156)	-1.00 (422)
	Total	-.29 (362)	-.63 (381)	- .91 (492)	
		F 3.0	4; 1226 d.f.	Sig. .05	

INTERACTION OF BINET I. Q. AND AGE

Table 61
Grade Scores in Arithmetic Computation (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	1.45 (116)	2.05 (124)	2.72 (159)	2.14 (399)
	Middle	1.79 (133)	2.78 (129)	3.52 (177)	2.78 (439)
	High	2.04 (142)	3.20 (128)	4.22 (155)	3.18 (425)
	Total	1.78 (391)	2.68 (381)	3.48 (491)	
		F 9.2	4; 1254 d.f.	Sig. .001	

Table 62
Deviation Scores in Arithmetic Computation (SAT)

	Age	Younger	Middle	Older	Total
Binet I. Q.	Low	.44 (102)	.20 (124)	.07 (159)	.21 (385)
	Middle	.14 (124)	-.15 (129)	-.37 (177)	-.16 (430)
	High	-.08 (139)	-.50 (128)	-.96 (155)	-.53 (422)
	Total	.14 (365)	-.16 (381)	-.41 (491)	
		F 3.0	4; 1228 d.f.	Sig. .05	

INTERACTION OF SEX AND BINET I. Q.

Table 63
Quotient Scores in Verbal Comprehension - Words (PMA)

Binet I. Q.		Low	Middle	High	Total
Sex	Male	65.6 (48)*	67.4 (99)	68.0 (159)	67.5 (306)
	Female	67.8 (44)	69.0 (71)	74.0 (63)	70.5 (178)
	Total	66.7 (92)	68.1 (170)	69.7 (222)	
		F 5.6.	2; 478 d. f.	Sig. .01	

Table 64
Deviation Scores in Battery Median (SAT)

Binet I. Q.		Low	Middle	High	Total
Sex	Male	-.26 (225)	-.82 (265)	-1.36 (286)	-.86 (776)
	Female	.02 (158)	-.33 (165)	- .64 (136)	-.30 (459)
	Total	-.15 (383)	-.63 (430)	-1.13 (422)	
		F 5.9	2; 1229 d. f.	Sig. .01	

Table 65
Deviation Scores in Paragraph Meaning (SAT)

Binet I. Q.		Low	Middle	High	Total
Sex	Male	-.42 (224)	-.97 (259)	-1.58 (286)	-1.04 (769)
	Female	-.03 (157)	-.41 (163)	- .81 (136)	- .40 (456)
	Total	-.26 (381)	-.75 (422)	-1.34 (422)	
		F 3.4	2; 1219 d. f.	Sig. .05	

Table 66
Deviation Scores in Word Meaning (SAT)

Binet I. Q.		Low	Middle	High	Total
Sex	Male	-.28 (224)	-.88 (259)	-1.49 (286)	-.93 (769)
	Female	.00 (157)	-.32 (165)	- .67 (136)	-.32 (458)
	Total	-.17 (381)	-.66 (424)	-1.23 (422)	
		F 6.6	2; 1221 d. f.	Sig. .01	

*Numbers in parentheses show number of cases.

INTERACTION OF SEX AND BINET I. Q.

Table 67
Deviation Scores in Spelling (SAT)

	Binet I. Q.	Low	Middle	High	Total
Sex	Male	-.28 (225)	-.81 (263)	-1.40 (286)	-.87 (774)
	Female	.24 (158)	-.08 (164)	- .37 (135)	-.06 (457)
	Total	-.07 (383)	-.53 (427)	-1.07 (421)	
		F 4.5	2; 1225 d.f.	Sig. .05	

Table 68
Deviation Scores in Arithmetic Reasoning (SAT)

	Binet I. Q.	Low	Middle	High	Total
Sex	Male	-.28 (224)	-.77 (265)	-1.15 (286)	-.77 (775)
	Female	-.15 (159)	-.46 (165)	- .69 (136)	-.42 (460)
	Total	-.23 (383)	-.65 (430)	-1.00 (422)	
		F 3.9	2; 1229 d.f.	Sig. .05	

INTERACTION OF RACE AND BINET I. Q.

Table 69
Binet MA Grade Expectancy

	Binet I. Q.	Low	Middle	High	Total
Race	White	1.97 (276)*	3.00 (296)	3.87 (323)	3.00 (895)
	Negro	1.98 (115)	2.79 (140)	3.15 (103)	2.63 (358)
	Total	1.97 (391)	2.93 (436)	3.70 (426)	
		F 8.6	2; 1247 d.f.	Sig. .001	

Table 70
PMA Grade Expectancy

	Binet I. Q.	Low	Middle	High	Total
Race	White	2.02 (265)	3.08 (282)	3.75 (290)	2.98 (837)
	Negro	2.21 (110)	2.88 (134)	2.93 (92)	2.67 (336)
	Total	2.08 (375)	3.02 (416)	3.56 (382)	
		F 10.0	2; 1167 d.f.	Sig. .001	

Table 71
Quotient Scores in Non-Reading Total Scores (PMA)

	Binet I. Q.	Low	Middle	High	Total
Race	White	57.1 (278)	65.8 (288)	72.6 (290)	65.2 (856)
	Negro	58.8 (114)	66.1 (137)	70.1 (94)	64.8 (345)
	Total	57.6 (392)	65.9 (425)	72.0 (384)	
		F 5.7	2; 1195 d.f.	Sig. .01	

Table 72
Quotient Scores in Spatial Thinking (PMA)

	Binet I. Q.	Low	Middle	High	Total
Race	White	52.9 (260)	64.3 (248)	70.5 (307)	63.0 (815)
	Negro	55.9 (99)	65.6 (125)	63.3 (84)	61.8 (308)
	Total	53.7 (359)	64.7 (373)	69.0 (391)	
		F 9.8	2; 1117 d.f.	Sig. .001	

* Numbers in parentheses show number of cases.

INTERACTION OF RACE AND BINET I. Q.

Table 73
Deviation Scores in Battery Median (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	-.19 (267)	-.70 (290)	-1.26 (319)	-.75 (876)
	Negro	-.04 (116)	-.48 (140)	- .73 (103)	-.41 (359)
	Total	-.15 (383)	-.63 (430)	-1.13 (422)	
		F 4.0	2; 1229 d.f.	Sig. .05	

Table 74
Deviation Scores in Paragraph Meaning (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	-.28 (265)	-.86 (282)	-1.47 (319)	-.91 (866)
	Negro	-.21 (116)	-.53 (140)	- .90 (103)	-.53 (359)
	Total	-.26 (381)	-.75 (422)	-1.34 (422)	
		F 4.8	2; 1219 d.f.	Sig. .01	

Table 75
Gains in Word Meaning Scores (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	.391 (178)	.389 (162)	.404 (181)	.395 (521)
	Negro	.224 (74)	.348 (99)	.452 (54)	.332 (227)
	Total	.342 (252)	.373 (261)	.415 (235)	
		F 3.2	2; 742 d.f.	Sig. .05	

Table 76
Deviation Scores in Spelling (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	-.10 (267)	-.60 (287)	-1.22 (318)	-.67 (872)
	Negro	.00 (116)	-.38 (140)	- .61 (103)	-.32 (359)
	Total	-.07 (383)	-.53 (427)	-1.07 (421)	
		F 4.0	2; 1225 d.f.	Sig. .05	

INTERACTION OF RACE AND BINET I. Q.

Table 77
Grade Scores in Arithmetic Reasoning (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	1.66 (281)	2.28 (299)	2.78 (323)	2.27 (903)
	Negro	1.84 (117)	2.26 (140)	2.50 (103)	2.19 (360)
	Total	1.71 (398)	2.28 (439)	2.71 (426)	
		F 3.4.	2; 1257 d.f.	Sig. .05	

Table 78
Deviation Scores in Arithmetic Reasoning (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	-.28 (267)	-.71 (290)	-1.11 (319)	-.72 (876)
	Negro	-.12 (116)	-.54 (140)	- .66 (103)	-.44 (359)
	Total	-.23 (383)	-.65 (430)	-1.00 (422)	
		F 3.5.	2; 1229 d.f.	Sig. .05	

Table 79
Grade Scores in Arithmetic Computation (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	2.16 (282)	2.89 (299)	3.30 (322)	2.81 (903)
	Negro	2.12 (117)	2.54 (140)	2.82 (103)	2.48 (360)
	Total	2.14 (399)	2.78 (439)	3.18 (425)	
		F 3.0	2; 1257 d.f.	Sig. .05	

Table 80
Deviation Scores in Arithmetic Computation (SAT)

Binet I. Q.		Low	Middle	High	Total
Race	White	.23 (269)	-.10 (290)	-.59 (319)	-.18 (878)
	Negro	.16 (116)	-.26 (140)	-.34 (103)	-.15 (359)
	Total	.21 (385)	-.16 (430)	-.53 (422)	
		F 5.7	2; 1231 d.f.	Sig. .01	

INTERACTION OF RACE AND SEX

Table 81
Average Gains in Achievement (SAT)

	Sex	Male	Female	Total
Race	White	.437 (318)*	.439 (202)	.438 (520)
	Negro	.347 (152)	.444 (75)	.379 (227)
	Total	.408 (470)	.440 (277)	

F 4.7   1; 743 d.f.   Sig. .05

*Numbers in parentheses show number of cases.

SECTION VI

PRIMARY MENTAL ABILITIES OF MENTALLY HANDICAPPED CHILDREN

The purpose of this section is to report the results of the administration of the appropriate form of the Tests of Primary Mental Abilities to mentally handicapped children. The forms used were those published by Science Research Associates, authors L. L. Thurstone and Thelma Gwinn Thurstone. Since the children studied all had very low mental ages, about half of them, between five and six hundred, took the form prepared for children of ages 5-7. This age level can be thought of as referring to the mental age of the child. Slightly more than half took the form for children with mental ages 7-11. In some cases a child who made rather high scores on the 5-7 form of the test was given the 7-11 form. In working up the results of the testing only one form, the highest level which the child was able to take, was considered.

The form used with the younger and more retarded groups was the Primary Mental Abilities test for ages 5-7. On the basis of this test four separate scores are obtained. These are:

1. Verbal Meaning or Verbal Comprehension. This test involves the comprehension of words, phrases, and sentences, and is presented entirely in pictorial form. No reading is necessary, and the test is not based on any school achievement.

2. Perceptual Speed. This section of the test measures the child's ability to perceive similarities and differences in visual material which is presented to him. The speed with which the child is able to perform this test is important in determining his score. The test has been shown to be related to success in learning to read in the primary grades.

3. Quantitative Thinking. This section of the test measures the child's ability to count, to understand non-numerical quantitative terms, and to carry out simple arithmetic reasoning tasks. In the case of the children who are included in this study,

there was probably some influence of school work because of drill on counting and on adding numbers. This is not true with the children to whom the test is normally given because they have not been in school long. Some of the children in our group of mentally retarded, however, had been in school for several years.

4. **Spatial Thinking.** This section of the test measures the child's ability to see the spatial and geometric relations in diagrammatic material which is presented to him. It is quite independent of the other factors measured by the test.

In the test for children with mental ages of 7-11 years, the same factors are measured as in the test described above except that there is a reasoning section added.

5. **Reasoning.** The reasoning test in this form is largely inductive. One part of the test depends upon reading single words, and a second part depends upon making inductions from material which is presented in diagrammatic form.

Copies of these tests are not appended because it is believed that they are familiar to most of the readers of this report.

In order to study the primary mental abilities of mentally handicapped children we have divided our total group into six subgroups as follows:

Children with I. Q. 's of 50-59 who took the 5-7 test.
Children with I. Q. 's of 50-59 who took the 7-11 test.
Children with I. Q. 's of 60-69 who took the 5-7 test.
Children with I. Q. 's of 60-69 who took the 7-11 test.
Children with I. Q. 's of 70-79 who took the 5-7 test.
Children with I. Q. 's of 70-79 who took the 7-11 test.

The results of the administration of the test to our total groups have been broken down further to show the results of White boys, White girls, Negro boys, Negro girls, total boys, total girls, total White, total Negro, and the total group. The results of all the testing are summarized in Tables 1 through 6. These tables show also any possible differences between boys and girls and between White and Negro children. None of the differences found are significant. The scores are reported in terms of quotients. For every test score the mental age equivalent was determined from the norms of the test, and the mental age score of the child was divided by his chronological age. This gives us a score which has approximately the same meaning for all of the children with whom we were working. All of the scores in Tables 1 through 6 are reported in terms of quotient scores, and the number in parentheses under each score indicates the number of children on which the average determination is made.

The charts which have been prepared on the basis of the data obtained from the Primary Mental Abilities tests show the important results very clearly. Figure 1 shows the scores in the four primary mental abilities: Verbal Comprehension, Perceptual Speed, Quantitative Thinking, and Spatial Thinking for all of the children who took the 5-7 form. The three groups as determined by Binet I. Q. are pictured separately. As is to be expected, of course, the three groups are at ascending levels on the PMA as the Binet intelligence quotients increase. It is more interesting, however, to note that the general shape of the profile is so nearly the same for the three I. Q. levels. It seems that we can quite safely conclude that the young children and children severely handicapped mentally have their greatest deficiency in space ability, and that their best performance is on the test of perceptual speed. Verbal Comprehension and Quantitative Thinking in all cases occupy intermediate positions.

If we turn to Figure 2 we see similar diagrams for all of the children who took the 7-11 test; again, the three levels as determined by the Binet I. Q. show three levels of performance on the primary mental abilities. Again, also, the most interesting characteristic of the Figure is that the three lines indicating the three profiles in the five mental abilities are so nearly parallel. At this level the children score highest in Quantitative Thinking and lowest in Reasoning. Almost all of the children in this group had been in school for several years, and it is our interpretation that the high scores in Quantitative Thinking are influenced by the amount of drill which has been put on arithmetic, particularly the simple arithmetic processes, in their school work. It will be recalled that in both achievement testings the Stanford Achievement test scores in arithmetic computation consistently ran higher than the scores in any other school subject. The mentally handicapped children seem to be able to profit from intensive drill in subjects which depend largely upon rote memory.

Charts 3 through 8 have been prepared to show a comparison for each of the Binet I. Q. levels on each of the two forms of the Primary Mental Abilities test. The four lines in each chart represent the separate profiles for White boys, White girls, Negro boys, and Negro girls. Again, all of the profiles have very similar form, and we are not able to conclude from these studies that there are any significant differences in mental profiles as determined by the Primary Mental Abilities test in the four groups just mentioned.

Mentally handicapped children seem to be retarded in all of the primary mental abilities, but not so severely retarded in some as in others. It may be mentioned that in second-order factor analyses of the primary mental abilities the factors of verbal comprehension and reasoning have had higher loadings on a general second-order factor than had the factors of perceptual speed, numerical thinking, and spatial thinking. If the second-order general factor is a general intellective factor of some kind, it would seem that the results of this study point to the conclusion that, on the average, the defect which leads to a condition which we describe as mental retardation is a generalized mental slowness or retardation. This is not to say that we are not interested in the finding of the similarity of the profiles on the charts.

GROUP COMPARISONS ON THE PRIMARY MENTAL ABILITIES

Five group comparisons have been made on the basis of the primary mental abilities. These are for the same variables which we have used throughout the study, namely, school placement, sex, race, Binet I.Q., and age. Each table shows a comparison of the average scores on each of the primary mental abilities for the two groups being considered. In the first column are listed the part scores or factor scores of the Primary Mental Abilities test. The second column gives the mean of the first group and it is followed by the number of cases on which this average is based. The next column gives the mean of the second group which is again followed by the number of cases on which it is based. The last three columns of the table show the analysis of variance results for the variables considered. They are reported only when they were significant at the five per cent level or better. It will be noticed that most of the ones which are given here are significant at the .01 or even at the .001 level.

The main observations to be made from these tables are summarized below.

1. School Placement and the Primary Mental Abilities.

Table 7 shows that there is a significant difference between the regular and the special class student on several of the quotient scores for the primary mental abilities. The test is a group test, and the response of the children on this is somewhat similar to their classroom response. It seems likely that the child who is able to give attention to the teacher and to follow directions is less likely to be placed in a special class, and that as a result the children in the regular classes show slightly higher scores on several of the primary mental abilities than the children in the special class.

Whenever there is a difference in intelligence test scores as measured by the Primary Mental Abilities test at the appropriate level, the difference is in favor of the children in the regular classes. It seems to be a fairly obvious interpretation of this finding if we remember that most of these tests scores listed above depend somewhat on the child's ability to read. If a child, even a mentally handicapped child, is able to read some, his chances of being kept in a regular classroom rather than to be assigned to a special education class are probably increased. It is our interpretation that this factor is the explanation for the significant differences between the scores of children in the two school classifications.

2. Sex Differences in the Primary Mental Abilities.

Table 8 shows that there are slight but statistically significant differences between the performance of boys and girls on the four tests. The scores on which the boys have a slight advantage are the Space Quotient scores and the Verbal Comprehension for the picture test Quotient scores. The two tests on which the girls show a slight but statistically significant advantage are the Verbal Meaning Quotients based on a reading test called V_W and the Reasoning Quotient based on a test involving the reading of words, called R_W. The interpretation of this finding seems fairly obvious if we recall that in the achievement test study there was a slight advantage in reading scores for the girls as compared with the boys. Probably this is the factor operating to produce the differences noted above.

3. Race Differences in the Primary Mental Abilities.

In the comparison of White and Negro children on the test scores of the Primary Mental Abilities test (Table 9), only two show a statistically significant difference. The Negro children were slightly better in the Reasoning Quotient scores, and the White children show a small superiority in the Verbal Comprehension scores based on a picture test. Since the differences are in both cases very small, though statistically significant, and no obvious explanation has been suggested, we shall not attempt an interpretation of these findings.

4. Binet I.Q. and Primary Mental Abilities Scores.

In the table comparing the Primary Mental Abilities scores of various groups on the Binet test it seems very obvious that since both tests are considered measures of intelligence there should be no surprise that all of the quotient scores on the Primary Mental Abilities test increase significantly with an increase in I. Q. as determined by an individual Binet test. In Table 10 presenting the results for the three I. Q. groups, it will be seen that all of the primary mental abilities quotient scores show significant variation with intelligence.

5. Age Differences and the Primary Mental Abilities.

In Table 11 are presented the comparisons for age. Again, it will be noticed that many of the quotient scores show reliable differences for the different age groups. There is a tendency for the older children whom we found in our groups to score lower on the Primary Mental Abilities tests than the younger children. This may be to some extent an artifact because the tests were not well suited to children of the advanced chronological age. Tests which have been constructed for older children were much too hard for these groups of mentally handicapped children. We even found twelve and fifteen year old children sometimes who could take only the Primary Mental Abilities tests for ages 5-7. The material in these tests is certainly not as interesting to these older students even though their mental maturity may be of the level for which the test was intended in use with normal children.

It will be noticed that the measures of relationship are given only for the quotient scores on the Primary Mental Abilities test. The mental age scores on the test were, of course, so influenced by all of the factors concerned here that we did not make the analysis for those variables.

GROUP AVERAGES ON PRIMARY MENTAL ABILITIES TESTS

Table 1

Quotient Scores on 5-7 Test

Pupils with Binet I. Q. 50-59

	Verbal Meaning	Perceptual Speed	Quantitative Thinking	Spatial Thinking
Boys White	50.65 (78)*	54.26 (74)	50.91 (74)	49.69 (64)
Girls White	51.82 (53)	55.83 (51)	53.25 (51)	47.90 (40)
Boys Negro	52.58 (25)	57.06 (25)	53.86 (25)	50.10 (25)
Girls Negro	50.60 (19)	57.55 (19)	54.29 (19)	49.13 (19)
Boys Total	51.12 (103)	54.97 (99)	51.65 (99)	49.81 (89)
Girls Total	51.50 (72)	56.30 (70)	53.53 (70)	48.30 (59)
White Total	51.12 (131)	54.90 (125)	51.86 (125)	49.00 (104)
Negro Total	51.73 (44)	57.27 (44)	54.05 (44)	49.68 (44)
Boys Minus Girls	.62	-1.33	-1.88	1.51
White Minus Negro	-.61	-2.37	-2.19	-.68
Total	51.27 (175)	55.52 (169)	52.43 (169)	49.20 (148)

*Numbers in parentheses show numbers of cases in the groups.

Table 2

Quotient Scores on 7-11 Test

Pupils with Binet I. Q. 50-59

	Verbal Meaning	Perceptual Speed	Quantitative Thinking (Numerical)	Spatial Thinking	Reasoning
Boys White	63.57 (30)	58.56 (31)	67.27 (31)	65.23 (30)	56.71 (28)
Girls White	62.66 (25)	58.42 (25)	67.30 (25)	61.93 (21)	57.22 (25)
Boys Negro	62.50 (14)	60.64 (14)	64.65 (13)	69.73 (13)	60.04 (13)
Girls Negro	64.83 (12)	60.83 (12)	65.17 (12)	60.00 (12)	59.83 (12)
Boys Total	63.12 (44)	59.21 (45)	66.50 (44)	66.59 (43)	57.77 (41)
Girls Total	63.36 (37)	59.20 (37)	66.61 (37)	61.23 (33)	58.07 (37)
White Total	63.16 (55)	58.50 (56)	67.28 (56)	63.87 (51)	56.95 (53)
Negro Total	63.38 (26)	60.73 (26)	64.90 (25)	65.06 (25)	59.94 (25)
Boys Minus Girls	-.24	.01	-.11	5.36	-.30
White Minus Negro	-.22	-2.23	2.38	-1.19	-2.99
Total	63.23 (81)	59.20 (82)	66.55 (81)	64.26 (76)	57.91 (78)

GROUP AVERAGES ON PRIMARY MENTAL ABILITIES TESTS

Table 3

Quotient Scores on 5-7 Test

Pupils with Binet I. Q. 60-69

	Verbal Meaning	Perceptual Speed	Quantitative Thinking	Spatial Thinking
Boys White	60. 33 (84)	65. 63 (84)	61. 43 (84)	59. 12 (81)
Girls White	58. 20 (60)	64. 67 (60)	62. 66 (60)	56. 31 (55)
Boys Negro	60. 64 (43)	66. 22 (43)	63. 71 (43)	59. 71 (43)
Girls Negro	58. 63 (15)	67. 03 (15)	63. 83 (15)	54. 77 (15)
Boys Total	60. 43 (127)	65. 83 (127)	62. 20 (127)	59. 32 (124)
Girls Total	58. 29 (75)	65. 14 (75)	62. 89 (75)	55. 98 (70)
White Total	59. 44 (144)	65. 23 (144)	61. 94 (144)	57. 98 (136)
Negro Total	60. 12 (58)	66. 43 (58)	63. 74 (58)	58. 43 (58)
Boys Minus Girls	2. 14	. 69	-. 69	3. 34
White Negro	-. 68	-1. 20	-1. 80	-. 45
Total	59. 64 (202)	65. 57 (202)	62. 46 (202)	58. 12 (194)

Table 4

Quotient Scores on 7-11 Test

Pupils with Binet I. Q. 60-69

	Verbal Meaning	Perceptual Speed	Quantitative Thinking (Numerical)	Spatial Thinking	Reasoning
Boys White	65. 29 (107)	65. 64 (111)	73. 25 (110)	73. 15 (107)	59. 95 (101)
Girls White	66. 45 (74)	69. 62 (75)	75. 18 (74)	68. 16 (70)	62. 03 (73)
Boys Negro	66. 73 (52)	64. 35 (54)	68. 35 (53)	69. 48 (49)	63. 94 (50)
Girls Negro	65. 74 (29)	66. 90 (30)	69. 30 (30)	69. 96 (26)	64. 78 (29)
Boys Total	65. 76 (159)	65. 22 (165)	71. 66 (163)	72. 00 (156)	61. 27 (151)
Girls Total	66. 25 (103)	68. 84 (105)	73. 48 (104)	68. 65 (96)	62. 81 (102)
White Total	65. 76 (181)	67. 24 (186)	74. 03 (184)	71. 18 (177)	60. 82 (174)
Negro Total	66. 38 (81)	65. 26 (84)	68. 69 (83)	69. 65 (75)	64. 25 (79)
Boys Minus Girls	. 49	-3. 62	-1. 82	3. 35	-1. 54
White Minus Negro	-. 62	1. 98	5. 34	1. 53	-3. 43
Total	65. 95 (262)	66. 63 (270)	72. 37 (267)	70. 72 (252)	61. 89 (253)

GROUP AVERAGES ON PRIMARY MENTAL ABILITIES TESTS

Table 5

Quotient Scores on 5-7 Test

Pupils with Binet I. Q. 70-79

	Verbal Meaning	Perceptual Speed	Quantitative Thinking	Spatial Thinking
Boys White	68.72 (71)	72.33 (71)	69.74 (71)	63.01 (71)
Girls White	68.07 (42)	72.83 (42)	70.50 (42)	62.17 (42)
Boys Negro	64.85 (34)	70.68 (34)	69.91 (34)	63.03 (34)
Girls Negro	66.50 (26)	74.58 (26)	73.27 (26)	62.81 (26)
Boys Total	67.47 (105)	71.80 (105)	69.80 (105)	63.02 (105)
Girls Total	67.47 (68)	73.50 (68)	71.56 (68)	62.41 (68)
White Total	68.48 (113)	72.52 (113)	70.02 (113)	62.70 (113)
Negro Total	65.57 (60)	72.37 (60)	71.37 (60)	62.93 (60)
Boys Minus Girls	.00	-1.70	-1.76	.61
White Minus Negro	2.91	.15	-1.35	-.23
Total	67.47 (173)	72.47 (173)	70.49 (173)	62.78 (173)

Table 6

Quotient Scores on 7-11 Test

Pupils with Binet I. Q. 70-79

	Verbal Meaning	Perceptual Speed	Quantitative Thinking (Numerical)	Spatial Thinking	Reasoning
Boys White	69.69 (151)	72.78 (157)	77.62 (156)	76.64 (153)	65.23 (148)
Girls White	72.90 (55)	75.45 (55)	79.63 (55)	75.19 (52)	68.61 (54)
Boys Negro	71.38 (32)	72.44 (32)	75.50 (32)	74.71 (29)	66.95 (31)
Girls Negro	75.50 (18)	70.28 (18)	77.79 (17)	69.44 (17)	75.17 (18)
Boys Total	69.99 (183)	72.72 (189)	77.26 (188)	76.33 (182)	65.53 (179)
Girls Total	73.54 (73)	74.18 (73)	79.20 (72)	73.77 (69)	70.25 (72)
White Total	70.55 (206)	73.47 (212)	78.14 (211)	76.27 (205)	66.13 (202)
Negro Total	72.86 (50)	71.66 (50)	76.29 (49)	72.76 (46)	69.97 (49)
Boys Minus Girls	-3.55	-1.46	-1.94	2.56	-4.72
White Minus Negro	-2.31	1.81	1.85	3.51	-3.84
Total	71.00 (256)	73.13 (262)	77.80 (260)	75.63 (251)	66.88 (251)

TABLE 7

SCHOOL PLACEMENT AND PRIMARY MENTAL ABILITIES

	Regular Classes		Special Classes				
	Mean	No. of Cases	Mean	No. of Cases	F	dfe	Sig.
PMA Quotient Scores							
Total	69.0	170	67.8	305			
Non-Reading Total	68.6	333	63.8	829	67.6	1158	.001
Verbal Comprehension (Total)	67.3	333	62.3	814	72.4	1143	.001
Verbal Comprehension (Words)	69.9	172	67.8	312	5.8	480	.05
Verbal Comprehension (Pictures)	69.4	201	68.9	410			
Spatial Thinking	65.5	314	61.6	809	18.3	1119	.001
Reasoning (Total)	64.4	198	63.0	381			
Reasoning (Words)	63.5	183	62.6	321			
Reasoning (Figures)	65.6	198	67.8	404			
Quantitative Thinking	71.0	328	66.0	828	38.2	1152	.001
Perceptual Speed	68.7	332	64.7	829	24.6	1157	.001

TABLE 8

SEX AND PRIMARY MENTAL ABILITIES

	Boys		Girls				
	Mean	No. of Cases	Mean	No. of Cases	F	dfe	Sig.
PMA Quotient Scores							
Total	67.8	299	68.9	176			
Non-Reading Total	65.6	732	64.5	430			
Verbal Comprehension (Total)	63.9	719	63.5	428			
Verbal Comprehension (Words)	67.5	306	70.5	178	13.4	480	.001
Verbal Comprehension (Pictures)	70.2	397	67.0	214	6.5	605	.05
Spatial Thinking	64.1	712	60.2	411	10.5	1117	.01
Reasoning (Total)	62.9	369	64.5	210			
Reasoning (Words)	62.0	325	64.6	179	12.6	500	.001
Reasoning (Figures)	67.2	394	66.9	208			
Quantitative Thinking	66.9	728	68.2	428			
Perceptual Speed	65.7	731	66.2	430			

TABLE 9

RACE AND PRIMARY MENTAL ABILITIES

	White		Negro				
	Mean	No. of Cases	Mean	No of Cases	F	dfe	Sig.
PMA Quotient Scores							
Total	68.2	333	68.2	142			
Non-Reading Total	65.3	840	64.9	322			
Verbal Comprehension (Total)	63.7	828	63.9	319			
Verbal Comprehension (Words)	68.1	342	69.8	142			
Verbal Comprehension (Pictures)	69.9	451	66.9	160	4.4	605	.05
Spatial Thinking	63.0	815	61.8	308			
Reasoning (Total)	62.9	426	65.3	153	7.8	575	.01
Reasoning (Words)	62.6	365	63.6	139			
Reasoning (Figures)	66.9	452	67.5	150			
Quantitative Thinking	67.6	837	66.8	319			
Perceptual Speed	65.8	839	66.0	322			

TABLE 10

BINET I.Q. AND PRIMARY MENTAL ABILITIES

	Lowest		Middle		Highest				
	Mean	No. of Cases	Mean	No. of Cases	Mean	No. of Cases	F	dfe	Sig.
PMA Quotient Scores									
Total	64.3	91	67.2	167	70.7	217	41.7	469	.001
Non-Reading Total	57.6	374	65.7	383	71.6	405	322.0	1156	.001
Verbal Comprehension (Total)	57.4	373	64.2	376	69.4	398	239.0	1141	.001
Verbal Comprehension (Words)	66.7	92	68.1	170	69.7	222	6.8	478	.01
Verbal Comprehension (Pictures)	65.0	115	67.0	227	72.6	269	31.9	605	.001
Spatial Thinking	53.7	359	64.7	373	69.0	391	105.0	1117	.001
Reasoning (Total)	59.6	111	62.2	213	66.3	255	37.5	573	.001
Reasoning (Words)	60.3	97	62.0	179	64.7	228	17.0	498	.001
Reasoning (Figures)	61.2	115	67.8	226	69.1	261	10.9	596	.001
Quantitative Thinking	59.4	373	68.8	380	73.5	403	154.0	1150	.001
Perceptual Speed	59.5	374	66.7	382	71.0	405	102.0	1155	.001

TABLE 11

AGE AND PRIMARY MENTAL ABILITIES

	Youngest		Middle		Highest				
	Mean	No. of Cases	Mean	No. of Cases	Mean	No. of Cases	F	dfe	Sig.
PMA Quotient Scores									
Total	78.7	27	71.9	132	65.8	316	99.0	469	.001
Non-Reading Total	67.5	352	64.4	351	63.9	459	12.1	1156	.001
Verbal Comprehension (Total)	66.0	350	63.1	348	62.5	449	16.0	1141	.001
Verbal Comprehension (Words)	80.5	28	72.4	135	65.9	321	74.3	478	.001
Verbal Comprehension (Pictures)	74.5	45	70.8	187	67.6	379	13.5	605	.001
Spatial Thinking	60.7	347	62.4	333	64.4	443	7.5	1117	.001
Reasoning (Total)	73.0	41	66.4	175	61.0	363	51.1	573	.001
Reasoning (Words)	71.7	39	66.7	144	60.1	321	77.1	498	.001
Reasoning (Figures)	70.7	47	68.3	181	66.1	374			
Quantitative Thinking	69.0	351	66.1	348	67.1	457			
Perceptual Speed	70.1	351	64.8	351	63.4	459	31.9	1155	.001

FIG. I

PMA PROFILE (FORM 5-7)

BY BINET GROUPS

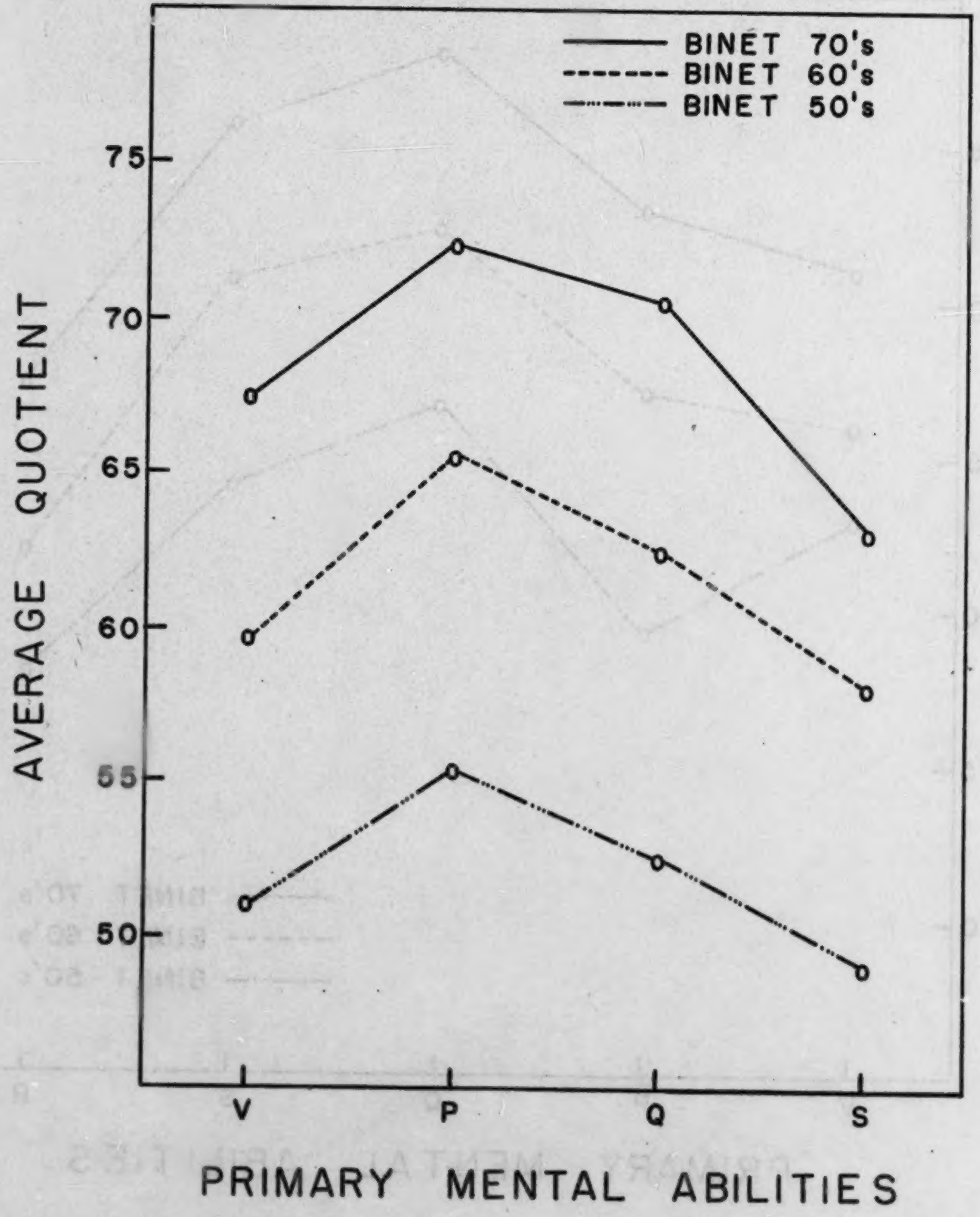


FIG. 2
PMA PROFILE (FORM 7-11)
BY BINET GROUPS

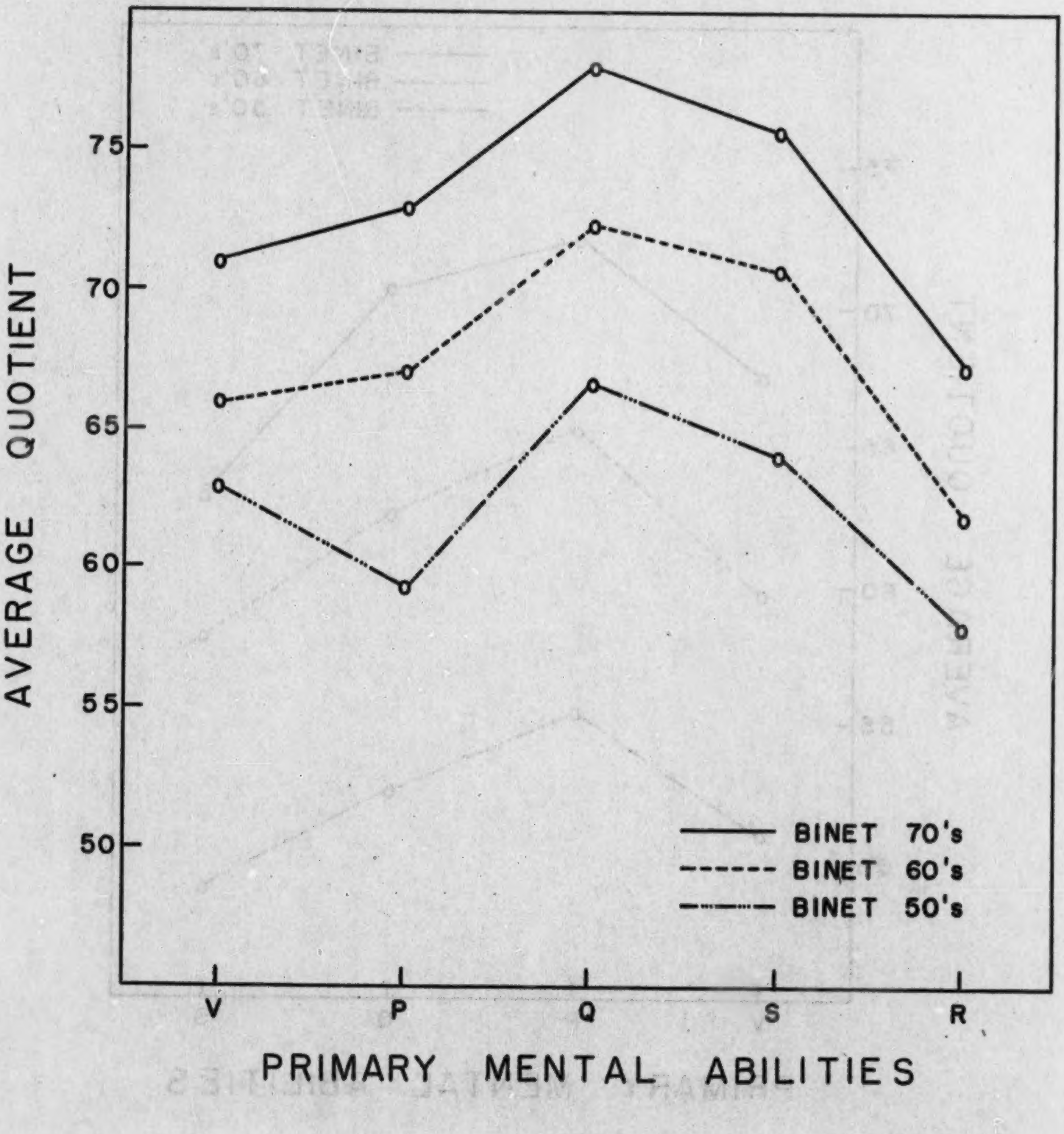


FIG. 3

PMA PROFILE (FORM 5—7)

BINET IQ, 50—59

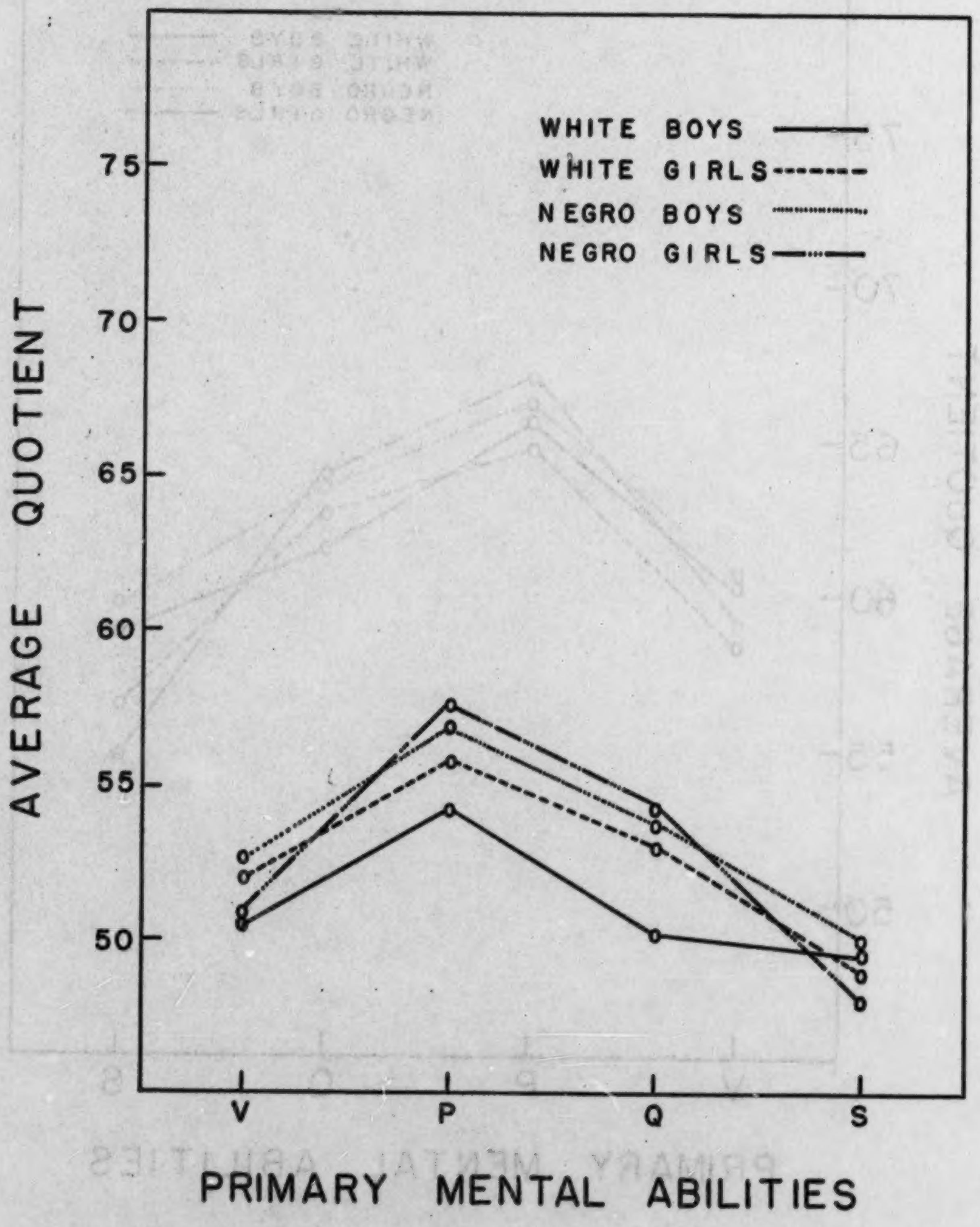


FIG. 4

PMA PROFILE (FORM 5—7)

BINET IQ, 60-69

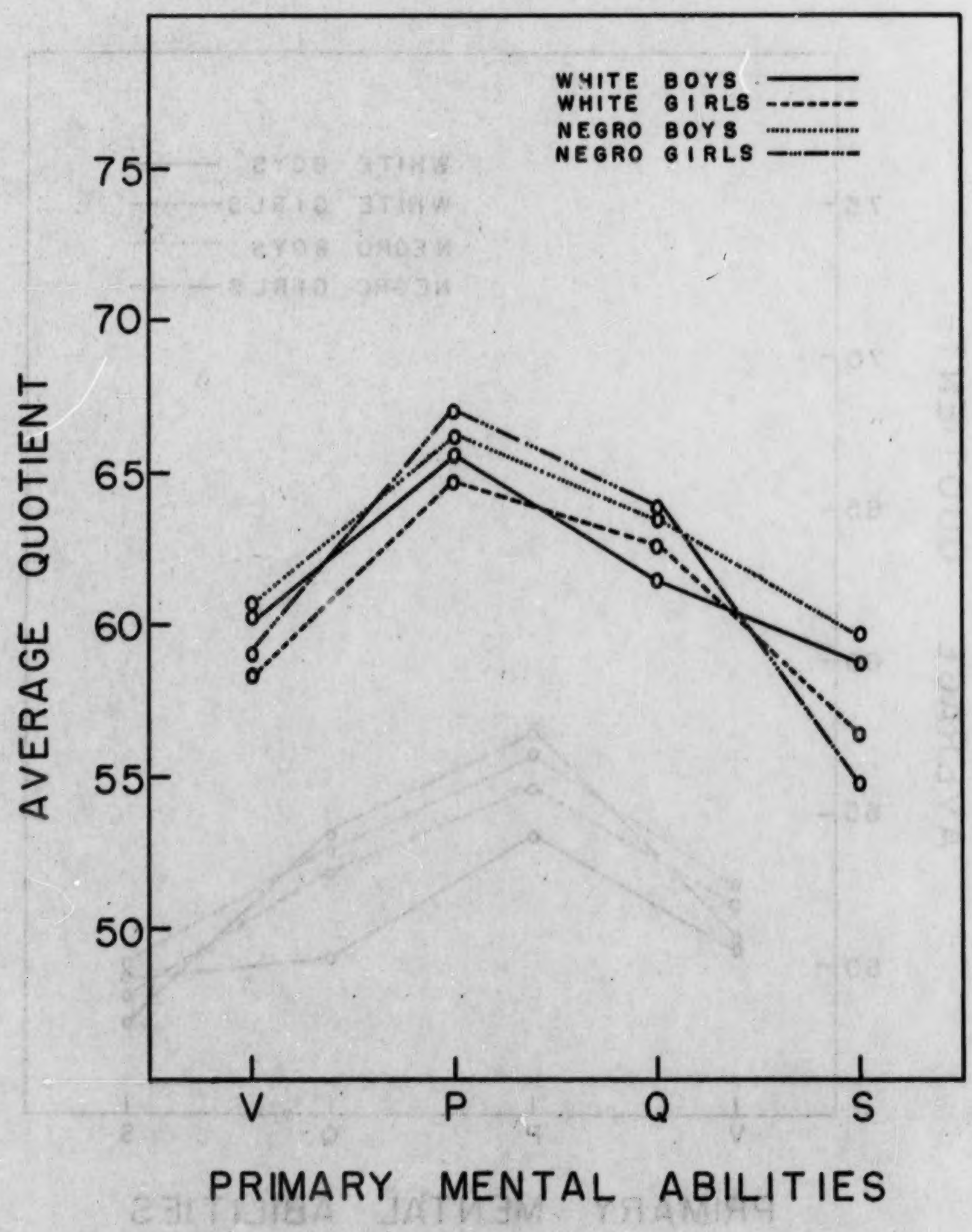


FIG. 5

PMA PROFILE (FORM 5-7)

BINET IQ, 70-79

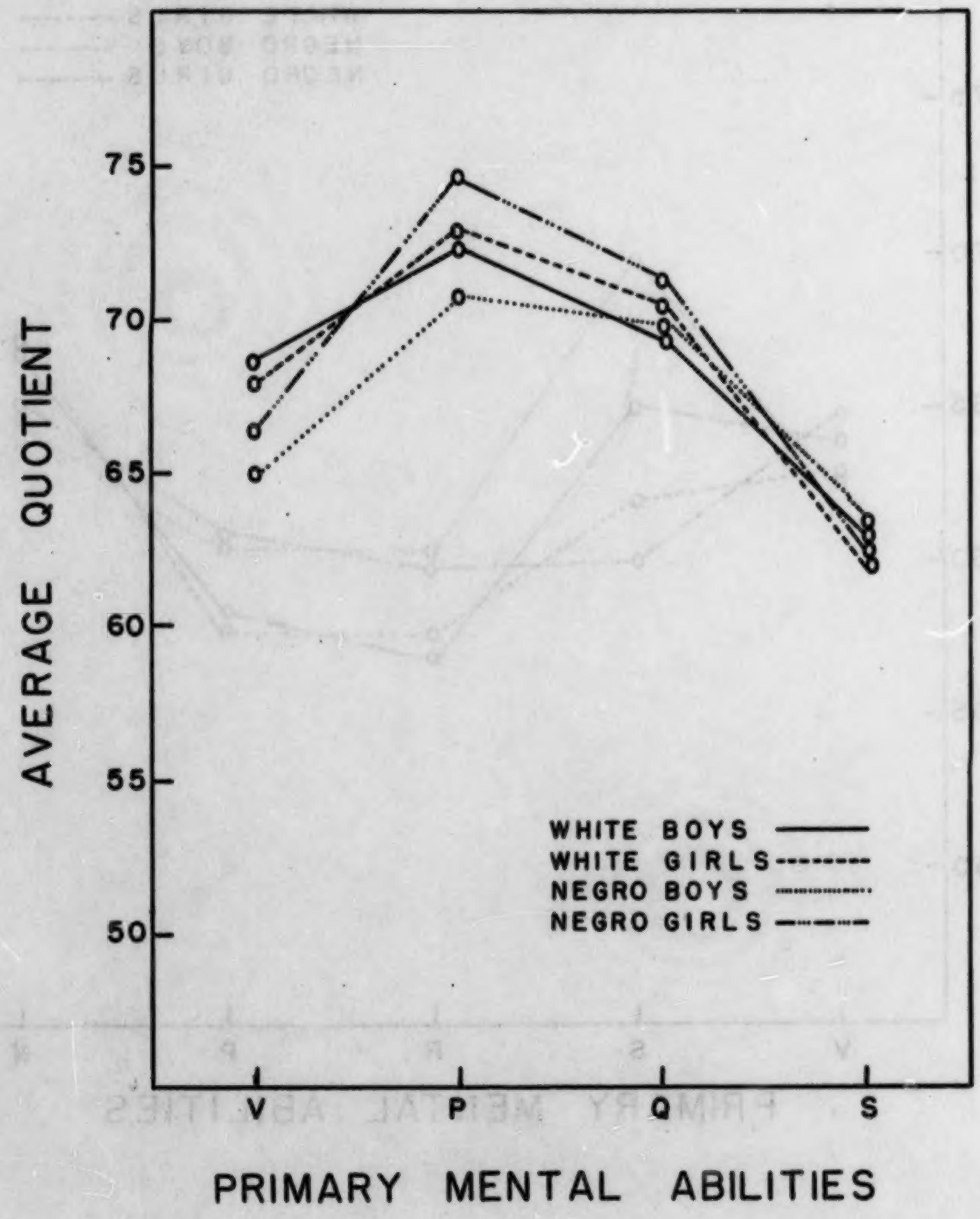


FIG. 6

PMA PROFILE (FORM 7-II)

BINET IQ, 50-59

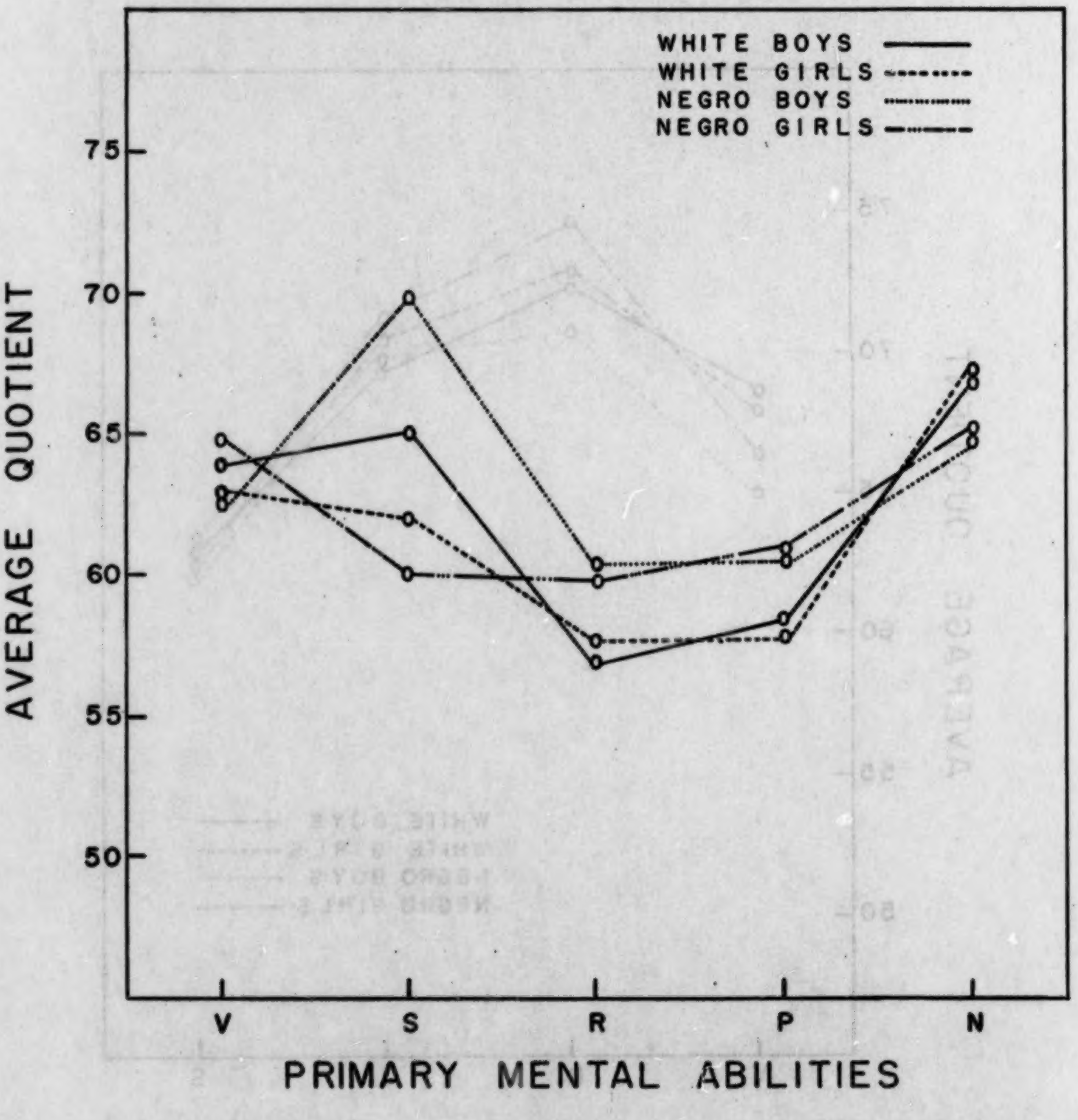


FIG. 7

PMA PROFILE (FORM 7—11)

BINET IQ, 60—69

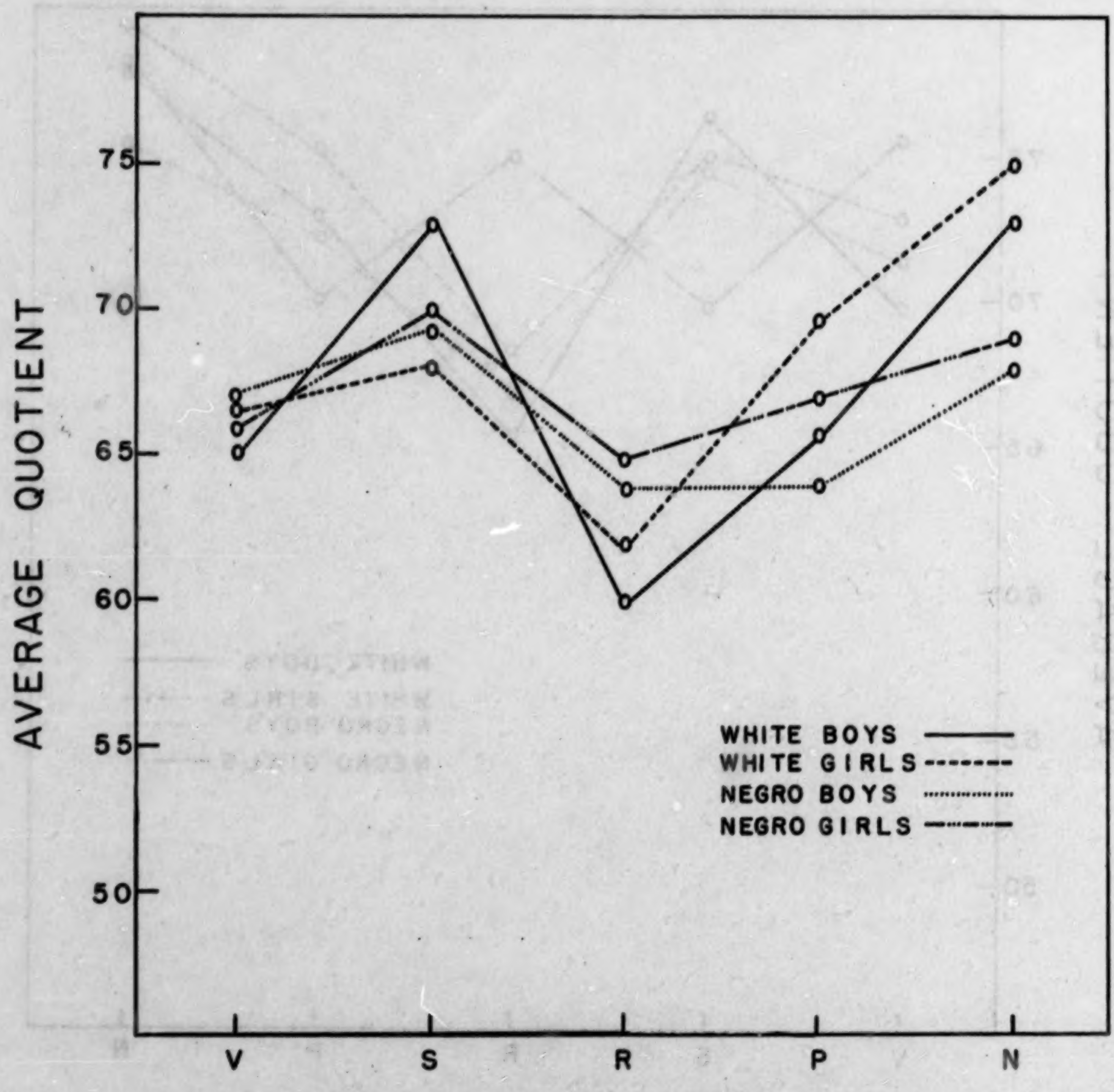
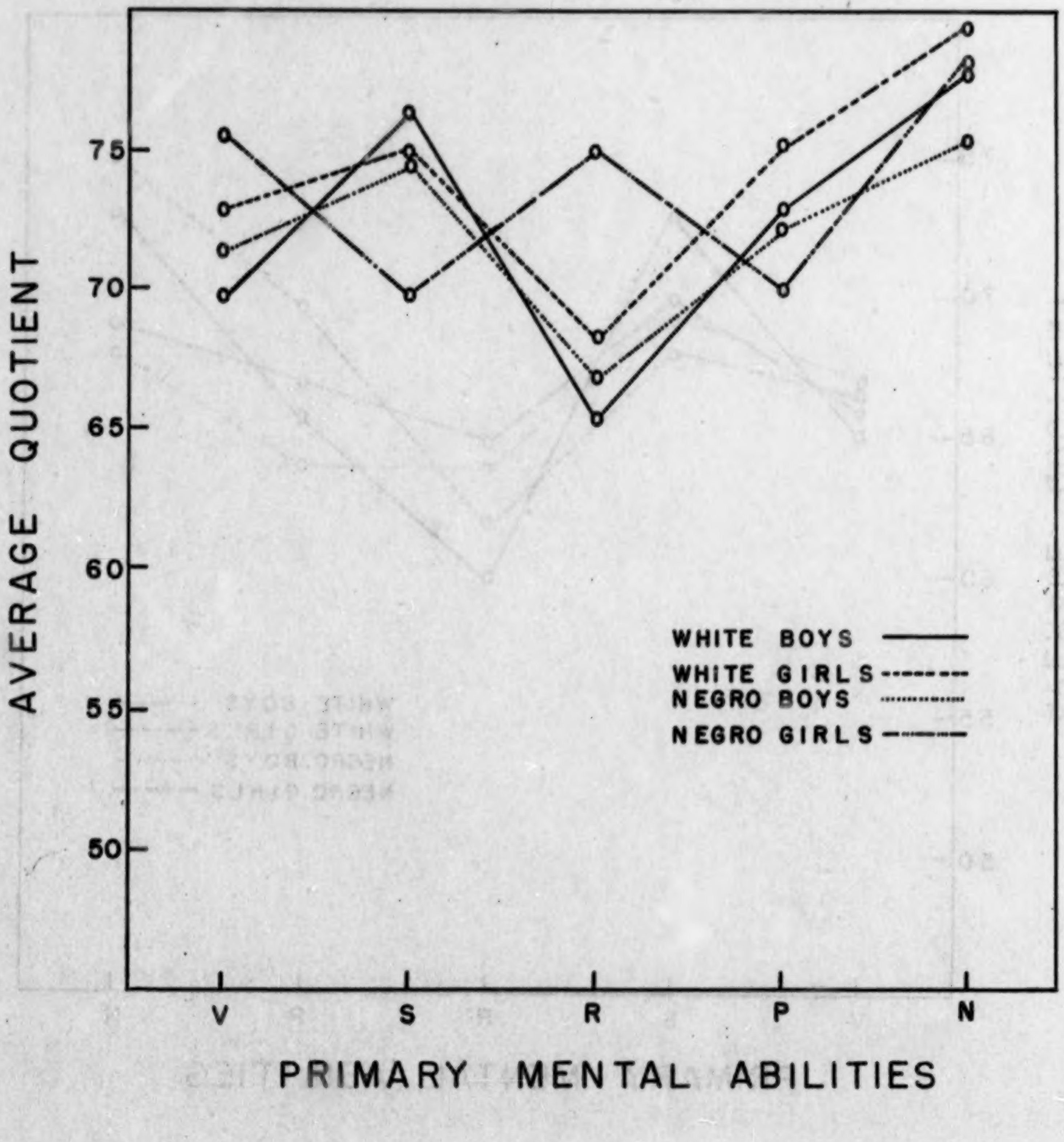


FIG. 8

PMA PROFILE (FORM 7-II)

BINET IQ, 70—79



SECTION VII

PERSONAL-SOCIAL TRAITS OF MENTALLY HANDICAPPED CHILDREN

A. M. Jordan

The present investigation proposed to study the personal-social traits of mentally handicapped children when they appear in small numbers in a regular class and when several of them constitute a special class. It was hoped to discover situations in which the same children during the school year would be, during a part of their school day, members of a regular class, and during another part of their school day, members of a special class. Under such conditions we might have been able to offer conclusive evidence concerning the advisability of placing (for purposes of education) mentally handicapped children in the regular class or in the special class. Unfortunately, we were unable to carry out the study under these conditions.

Our present study compares certain personal-social traits of mentally handicapped children (I. Q. 's 50-75) when members of a regular class (one to four in a class) and when members of a special class (five to twenty-five in a class). It is understood that the children composing the regular class are not the same as those children composing the special class. We have to assume that handicapped children are enough alike that conclusions drawn from adequate numbers in the two types of classes would be valuable and possibly, though not certainly, conclusive.

The Procedures

Two procedures were used to obtain information concerning the personal-social status of each of the children studied. The first of these procedures is a sociometric technique frequently used. Each child was asked to answer these questions: (1) Who are your best friends in this class? (2) If you were having a party at your house, which children in your class would you like best to come to it? (3) When you are playing at recess with children of your class, which

children do you like best to play with? For each of the three questions each child was asked to list five children from his class. In many cases we also asked each child to write down the name of his very best friend. By means of these four questions each child had an opportunity to receive many choices. A first choice was counted five; a second choice, four; a third choice, three; a fourth choice, two; and a fifth choice, one.

The second procedure asked teachers to rate each child on ten traits. Nine of the rating scales had five defined points while the tenth was a check list This schedule is appended.

The list of personality traits in item 10 was culled from various lists of traits which children had rated as being desirable or undesirable when possessed by other children.

Children in Regular Classes

Our first problem was to discover children with I. Q. 's of 50-75 who were members of a regular class. Usually there was one and not more than two in any one regular class. On one or two occasions we discovered three or four mentally handicapped in a regular class. When one or more mentally handicapped children were discovered in a single class, each member of the class answered the questions contained in the already described sociometric technique. In this manner, children in our I. Q. range of 50-75 had a chance of receiving votes equal to that of other children. Altogether, we located 30 regular classes in grades 3 to 8 which contained 40 children whose I. Q. 's ranged from 50-75. The class size varied from 23 to 38 children with an average of 32. Our index of social acceptance was derived from the number of times each child was mentioned as best friend, as a friend to be invited to a party, or to play with at recess.

Thirty-five of these children had complete records. Of these thirty-five, eight received no votes at all, not even a fifth choice in any one of three categories.

SOCIAL TRAITS

Date ______________________ **Child's Name** ______________________

Name of Teacher ______________________ **Date of Birth** ______________________

Name of School ______________________ **Sex** ________ **Grade** ____________ **I. Q.** ____________

To the teacher:

The School of Education at the University of North Carolina is engaged in a research project on certain aspects of the social development of elementary-school children. We are requesting your help in making ratings on a selected list of traits. Will you please ask the child the three questions on this page and write down the answers he gives, then rate each child on the traits defined on the following pages.

We shall need a list of all the children in your room. Please attach the list to your ratings.

Your cooperation is highly appreciated.

A. M. Jordan
Professor of Education
University of North Carolina

Questions for Children

1. Who are your best friends in this class?

First Choice ______________________ **Second Choice** ______________________

Third Choice ______________________ **Fourth Choice** ______________________

Fifth Choice ______________________

2. If you were having a party at your house, which children in your class would you like best to have come to it?

First Choice ______________________ **Second Choice** ______________________

Third Choice ______________________ **Fourth Choice** ______________________

Fifth Choice ______________________

3. When you are playing at recess with children of your class, which children do you like best to play with?

First Choice ______________________ **Second Choice** ______________________

Third Choice ______________________ **Fourth Choice** ______________________

Fifth Choice ______________________

RATING SCALES

Instructions to Raters: On each line for Items 1-8 make a check at the point which best describes this child.

1. Keeping in mind this child's total personality, how would you rate his emotional adjustment?

Very poor	Poor	Average	Good	Very good

2. How does this child evaluate his own mental ability?

Discouraged, self-belittling	Feels somewhat inferior	Realistic	Tends to overrate ability	Overconfident

3. In the total life of this child at home, at play and in school do you consider him to be

very unhappy?	frequently unhappy?	average?	usually happy?	very happy?

4. What is this child's attitude toward his school?

Hates school	Dislikes it somewhat	Average interest in school	Likes it	Loves school

5. To what extent does this child participate in the learning activities of the school, for example, in reading, drawing, activity programs, or in class reports?

Never	Rarely	Average	Usually	Enthusiastic participation

6. Among members of his class does this child have

no friends?	one friend?	a few friends?	several friends?	many friends?

7. How does this child enter into social relations with the members of this class in the classroom, on the playground and in other social activities?

Goes it alone	Joins in reluctantly	About average	Joins in eagerly	Initiates activities

8. How does this child obey the rules necessary for carrying on group activities in class?

Defiant, refuses to obey class rules	Obeys when compelled	Sometimes disobeys rules	Obeys most rules with little supervision	Obeys cheerfully, very cooperative

9. Indicate by a check mark at the appropriate point on the line the frequency of occurrence in this child of each of the behavior traits listed below.

	Has never occurred	**Occurred once or twice but no more**	**Has occurred occasionally**	**Occurs frequently**	**A constant problem**
a. cheating					
b. lying					
c. defiance of discipline					
d. temper outbursts					
e. bullying					
f. stealing					
g. truancy					
h. sex offenses					
i. speech difficulties					
j. fighting					

10. Check in the list below the personality traits which describe this child.

A

a. _____ attention seeking
b. _____ boastful
c. _____ bossy
d. _____ impudent
e. _____ noisy
f. _____ quarrelsome
g. _____ rebellious
h. _____ restless
i. _____ shy
j. _____ spoiled
k. _____ untidy
l. _____ sulky

B

a. _____ affectionate
b. _____ cooperative
c. _____ dependable
d. _____ energetic
e. _____ fair
f. _____ friendly
g. _____ fun-loving
h. _____ generous
i. _____ good sport
j. _____ kind
k. _____ neat
l. _____ smiles readily

For these 35 the results of the choices by members of the class were:

	Average	Range
Best Friend	4.1	0-17
Invite to Party	3.6	0-16
Play with at recess	5.0	0-21
Total	12.7	0-53

In order to get the full significance of the paucity of these choices, they may be compared with the average of choices received by the rest of the class. Out of 917 regular members only fifteen were total isolates. Thus the 35 mentally handicapped furnished 43 per cent of the total isolates. The average number of points received by members of the regular class whose I. Q.'s were 76 and above was 45 with a range of 0 to 178.

The question immediately arises as to the relation between the I. Q. and the votes received by these 35 mentally handicapped children.

I. Q.	N	Av.	Range	Isolates	% Isolates
50-59	7	3.3	0-9	3	43
60-69	16	12.7	0-50	4	25
70-75	12	16.8	0-53	1	8

These data indicate a direct relation between the I. Q. and the number of choices received from members of the class.

Other Investigations

The study that most nearly paralleled the present investigation was that of Orville G. Johnson.[1] His population of 39 mentally handicapped children residing among 698 children may be compared with our 35 residing among 919 children.

[1] Johnson, Orville G. "A Study of the Social Position of Mentally Handicapped Children in the Regular Grades" Am. J. of Mental Deficiency, 1950-pp. 60-69.

The two studies differed in several particulars. His three areas of choice were (1) liked best, (2) liked best to sit by, and (3) liked best to play with. His "liked best to sit by" paralleled our choice for attending a party. In the second place, he collected both acceptance and rejectance scores. In the third place, the children in the Johnson investigation were placed in the regular classes because their social quotient of 76.3 was ahead of their intelligence quotient of 63.69. In spite of these differences in the design of the study the results were remarkably similar.

TABLE 1

ACCEPTANCE - REJECTANCE SCORES OF MENTALLY HANDICAPPED[2]

	N	**Percent Stars**	**Percent Isolates**	**Percent Rejectees**
Lower Mentally Handicapped	**7**	**0**	**85.7**	**42.86**
Upper Mentally Handicapped	**32**	**6.26**	**65.6**	**16.85**
Borderline	**38**	**7.89**	**47.4**	**10.53**
Remainder of Pupils (Typical)	**621**	**18.04**	**38.5**	**4.03**

The percentage of stars, isolates, and rejectees tells the story clearly. Mentally handicapped in this study are rarely accepted but are much more often rejected than their normal classmates. Forty per cent of the rejectees came from the mentally handicapped group, eleven times as many as from the normal group. Johnson concludes, "The social segregation of mentally handicapped in the regular grades was quite complete."[3] It is an interesting commentary on these findings that the mentally handicapped were not rejected because they were stupid but because of their lying, bullying, fighting, cheating, showing off, or because they

[2] **Johnson, ibid.**

[3] **Johnson, ibid.**

were dirty, unkempt, or smelled bad. There were seven cases of lower mentally handicapped in each of the two studies, none of whom were stars and many of whom were isolates, 43 per cent in the present study and 85 per cent in Johnson's study. The smaller per cent of isolates in the present study may have been due to the five choices used in the present study and to three choices in Johnson's study.

A second study which is as yet unpublished was performed by Jack Luttrell. This investigation had as its subjects 17 mentally handicapped children in the schools of Chapel Hill, North Carolina. In this study with Negro children, two fourth grade classes and two sixth grade classes chose their friends, as well as those they rejected. Two areas were investigated: (1) children chosen to sit by and (2) children chosen to play with as well as (1) not to sit by and (2) not to play with. The results agree closely with the two studies already referred to.

TABLE 2

SOCIO-ECONOMIC SCORES OF MENTALLY HANDICAPPED CHILDREN IN REGULAR CLASSES (Luttrell)

SEATING	N	Acceptance	Rejectance
Normal	128	7.59	5.41
Mentally Handicapped	17	1.34	16.48
PLAY SITUATION			
Normal	128	7.13	5.08
Mentally Handicapped	17	2.24	14.05

The differences between acceptance and rejectance scores are in the same direction as the results of the two previous investigations.

A third study (Baldwin, 1958)[4] while using a slightly different technique arrived at the same conclusions. In Baldwin's study 31 cases of mentally handicapped children (I. Q. 's 50-74) were located in 22 regular classes in grades 4-6. The median chronological age for the 31 was 11. 1; for the other 572 pupils, it was 10. 3. Intelligence was appraised by the WISC; social acceptance, by the Ohio Social Acceptance Scale. The directions for this latter are: "On a separate sheet you will find the name of every student in your class. We want you to put a number in front of every name. The number you put down should be the number of one of the following paragraphs:

---

[4] Baldwin, Willie Kate, "The Social Position of the Educable Mentally Retarded child in the Regular Grades in the Public Schools," Exceptional Children, Nov. 1958, pp. 106-108, 112.

(1) My very, very best friend*
(2) My other friends.
(3) Not friends but O. K.
(4) Don't know them.
(5) Don't care for them.
(6) Dislike them."
*Descriptive paragraphs omitted here.

The major results were:

	First Quartile	Fourth Quartile
Mentally Handicapped	3. 2	61. 3
Non Mentally Handicapped	2. 6	22. 7

The differences are statistically significant at the one per cent level of confidence. This investigator found no significant relation between I. Q., sex, chronological age and grade level and social position scores. The presence of other mentally handicapped children (from one to four) in the same class showed no relation to acceptance score. The general conclusion was that one to four mentally handicapped children in a regular class were largely socially segregated. In one particular the results were different from those of other investigations in that social acceptance did not increase with I. Q. level. Furthermore, the teachers and pupils reported that the anti-social attitudes of these mentally handicapped children were resented both by children and teachers. Pupils said, "he bothers us," "talks too much," "talks back to teacher," "he disturbs our class," "he fights too much."

Suppose now we consider the total picture. We have presented the results of four investigations, each different in methods of procedure, but each coming to the same conclusion.

There is the present study of 35 cases using the sociometric techniques to discover personal-social relations. In the second place, there is Johnson's study of 39 cases gathering votes for both acceptance and rejectance. In the third place, the study of Luttrell gathered information on 17 Negro children in a manner similar to Johnson's. Finally the study of Baldwin who used the Ohio Social Acceptance Scale with 31 children was cited. Thus, we have records of 122 mentally handicapped children distributed in about 100 classrooms and investigated with different techniques. These four investigations came individually to the same conclusion that the social segregation of the mentally handicapped in the regular grades is quite complete.

In the second place, mentally handicapped children in regular classes as Johnson and Baldwin have pointed out develop bad compensatory habits for their lack of achievement. Thus Johnson reported unpopularity of the mentally handicapped because they bullied, cheated, showed off, and fought; facts which were confirmed in Baldwin's study. In the third place, Baldwin pointed out, what many teachers confirm, that these mentally handicapped children interfere seriously with the learning activities of the other members of the class.

The question often arises as to the social interaction of children within the same class. In brief, are children in a special class as friendly to each other as are those in a regular class? Do mentally handicapped children fare as well socially when members of a regular class as when members of a special class? The present section introduces seven sociograms which display visually what our data have already shown.

The sociograms are constructed from the questions which form a part of our schedule called "Social Traits". On this instrument children were asked to list five of their classmates in each of three categories: (1) best friend, (2) invite to a party (3) play with at recess. Each child may or may not be chosen in any of the three categories. If he receives no choices he is called an "isolate". On the other hand he may receive one or more choices which we have scored as points; five for first choice, four for second choice, etc. until he receives one point for choice five. The sum of these points constitutes his social score.

For illustrative purposes we have constructed seven "target" sociograms with concentric circles which help us understand degrees of social acceptance. For example, in Figure 1 the outer area includes scores from 0-8, the middle area, scores from 9-18, and the inner area scores from 20-41. The smaller the scores the less often is a child chosen as best friend.

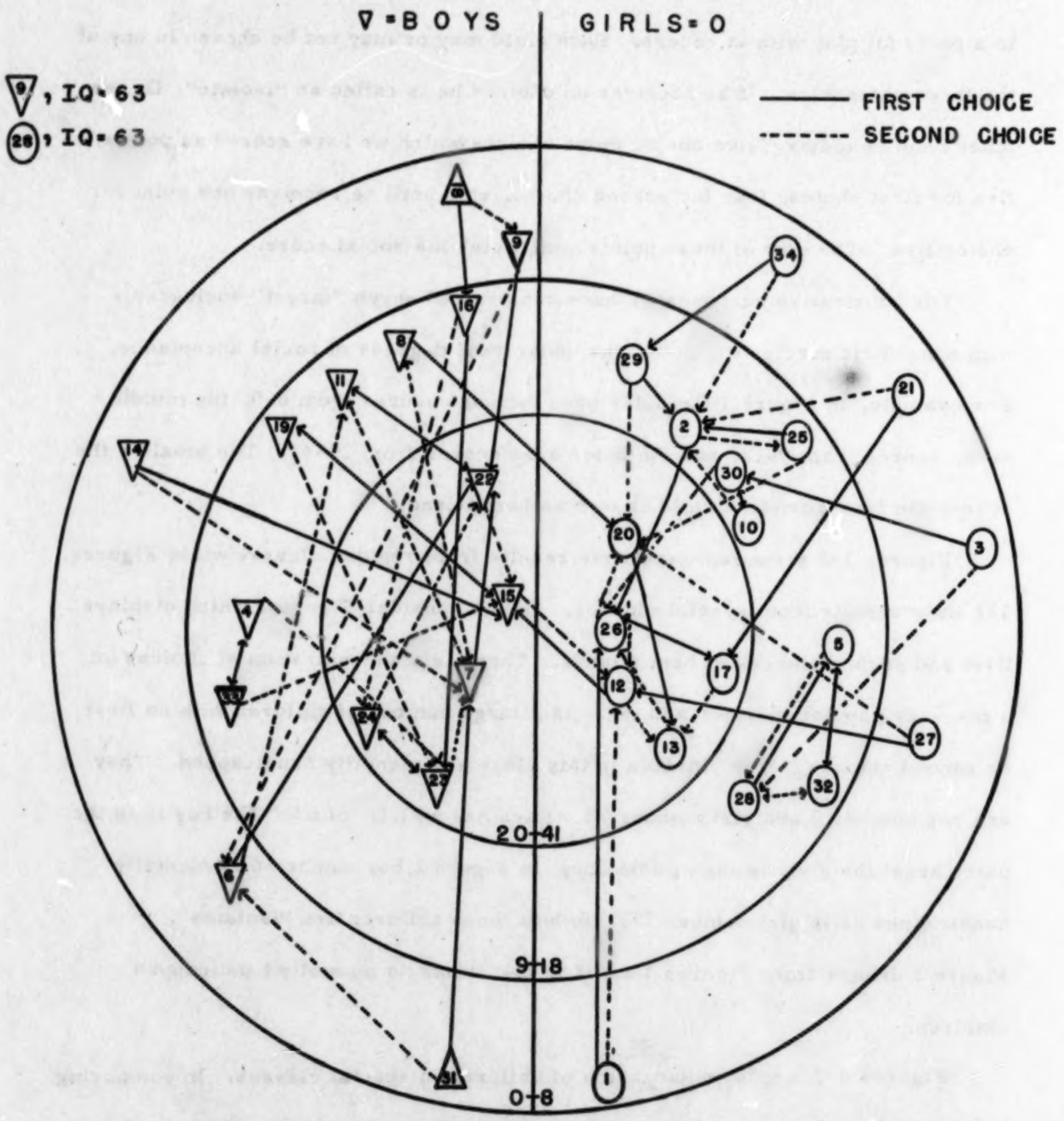
Figures 1-3 show representative results from regular classes while Figures 4-7 show results from special classes. Let us consider Figure 1 which displays first and second choices of best friends. There is a concentration of choices on a few very popular children and there is a large number of children with no first or second choices. Two children in this class are mentally handicapped. They are boy number 9 and girl number 28. Each has an I. Q. of 63. The boy is in the outer area; the girl, in the middle one. In Figure 2, boy number 6 is mentally handicapped as is girl number 27. Both of these children are "isolates". Figure 3 differs from Figures 1 and 2 in that it has no mentally handicapped children.

Figures 4-7 display sociograms of children in special classes. In comparing these figures with Figures 1-3 one notices a similar concentration of choices around favored individuals as well as a lack of choices for the unfavored ones. In short, similar contours appear in the sociograms made from the choices of

FIG. 1

BEST FRIEND IN CLASS

FIRST AND SECOND CHOICES

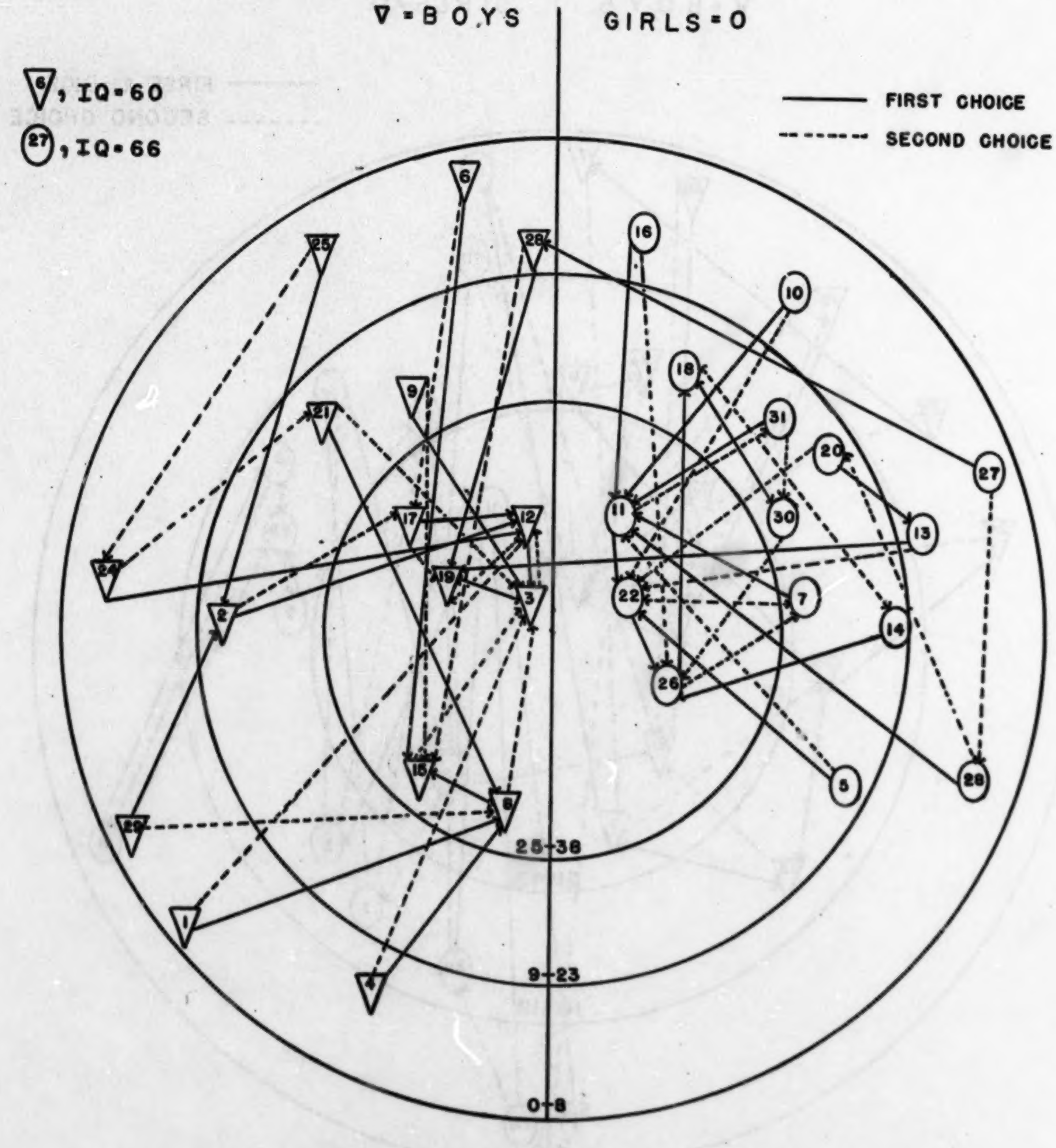

▽ = BOYS
GIRLS = O
9, IQ = 63
28, IQ = 63
FIRST CHOICE
SECOND CHOICE
18
9
34
16
8
29
21
11
2
25
19
14
22
30
10
20
3
15
4
26
5
12
17
33
7
24
13
27
23
28
32
6
31
1
20-41
9-18
0-8

REGULAR CLASS OF 34 PUPILS

FIG. 2

BEST FRIEND IN CLASS

FIRST AND SECOND CHOICES

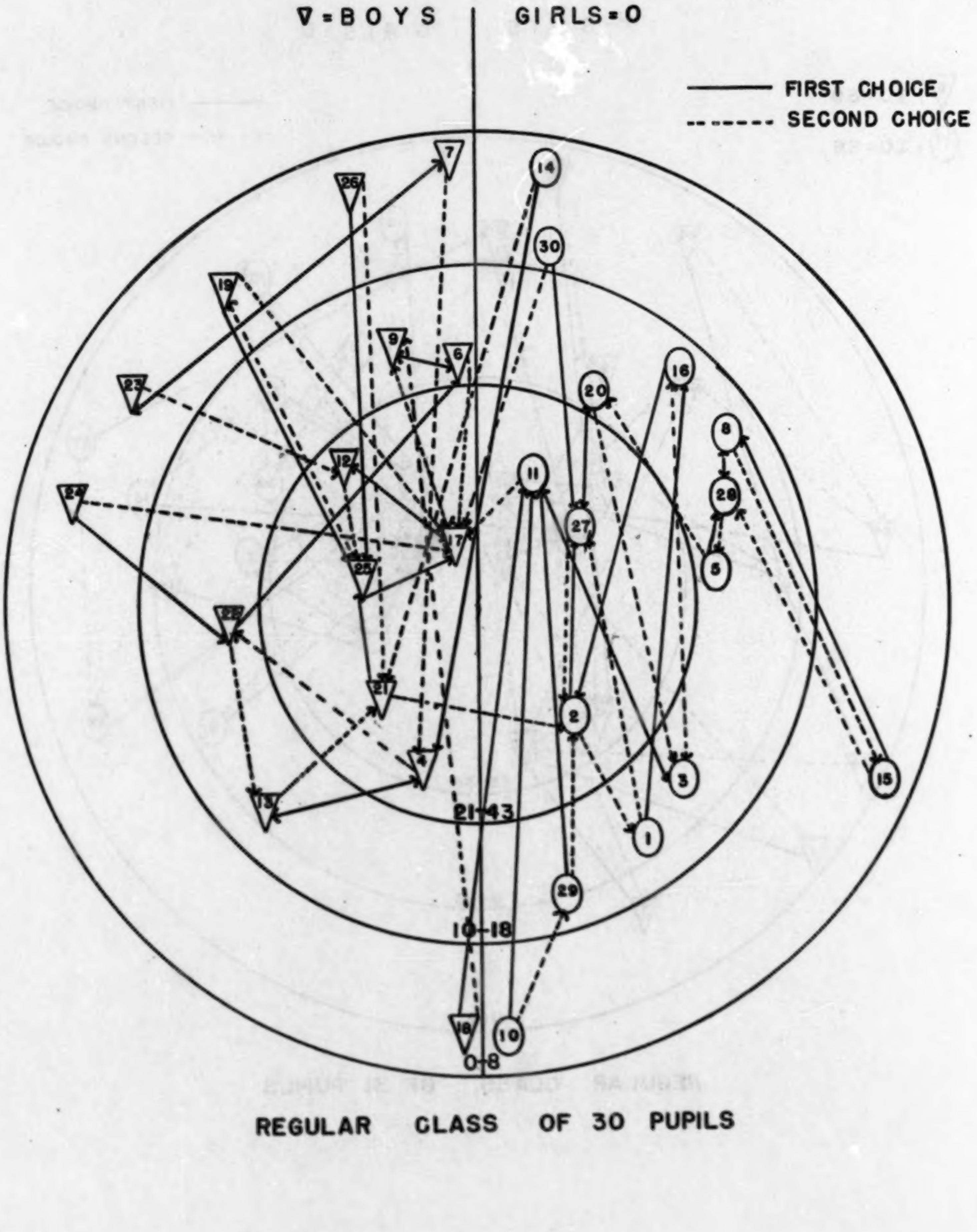

∇ = BOYS
GIRLS = O
6, IQ = 60
27, IQ = 66
FIRST CHOICE
SECOND CHOICE
6
25
28
16
10
18
9
21
31
20
27
17
12
11
30
13
24
19
3
22
7
2
14
26
15
8
5
28
29
1
4
25-36
9-23
0-8

REGULAR CLASS OF 31 PUPILS

FIG. 3

BEST FRIEND IN CLASS

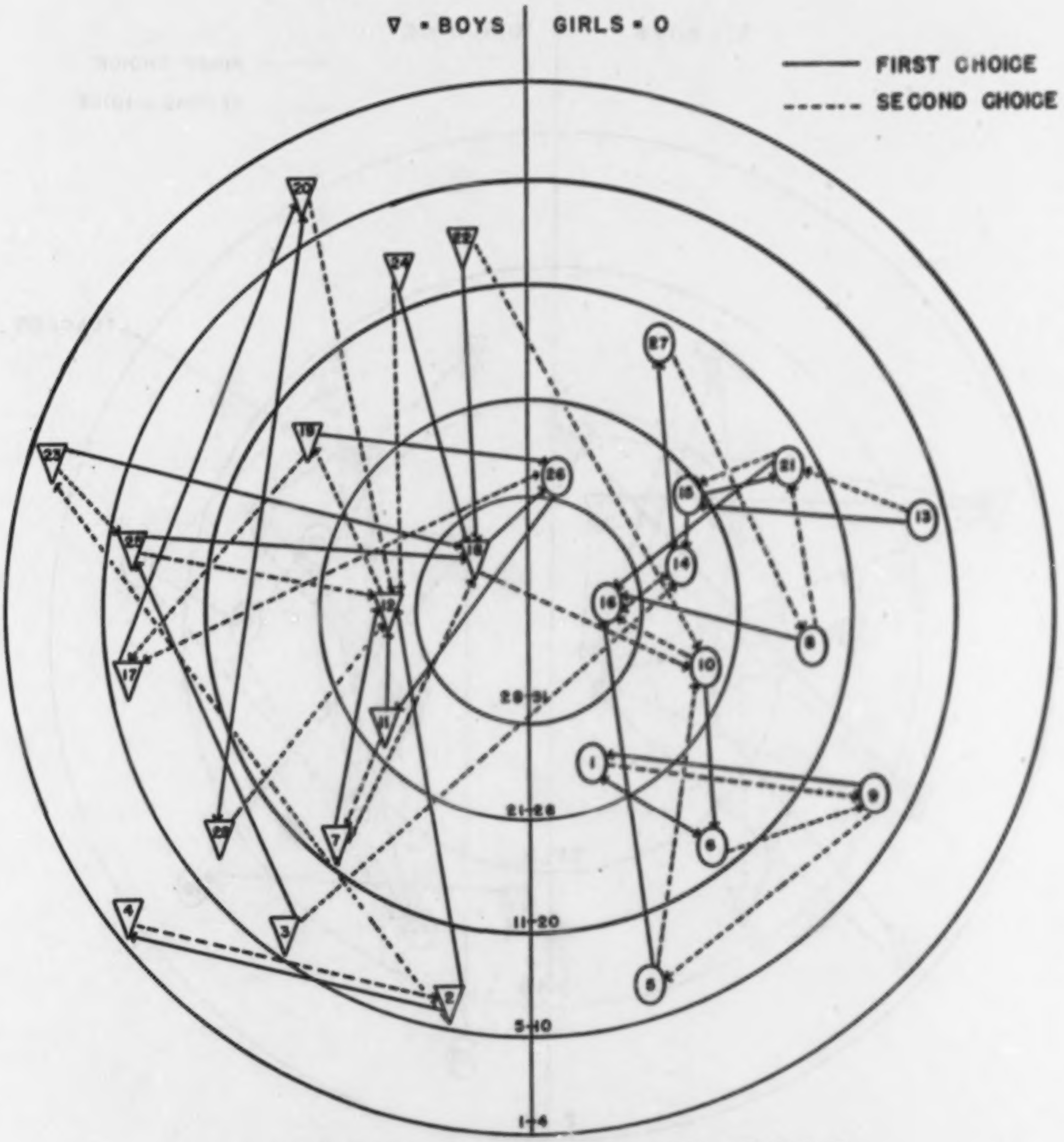
FIRST AND SECOND CHOICES


∇ = BOYS
GIRLS = O
—— FIRST CHOICE
------ SECOND CHOICE
7
14
26
30
19
9
6
16
23
20
8
12
11
24
28
27
17
5
25
22
21
2
4
3
15
13
1
21-43
29
10-18
18
10
0-8

REGULAR CLASS OF 30 PUPILS

FIG. 4

BEST FRIEND IN CLASS
FIRST AND SECOND CHOICES
SPECIAL


∇ = BOYS
GIRLS = O
——— FIRST CHOICE
- - - - - SECOND CHOICE
20
24
22
27
23
18
21
15
26
13
25
19
14
12
16
8
17
10
11
28-31
1
9
28
7
21-28
6
4
3
11-20
5
2
5-10
1-4

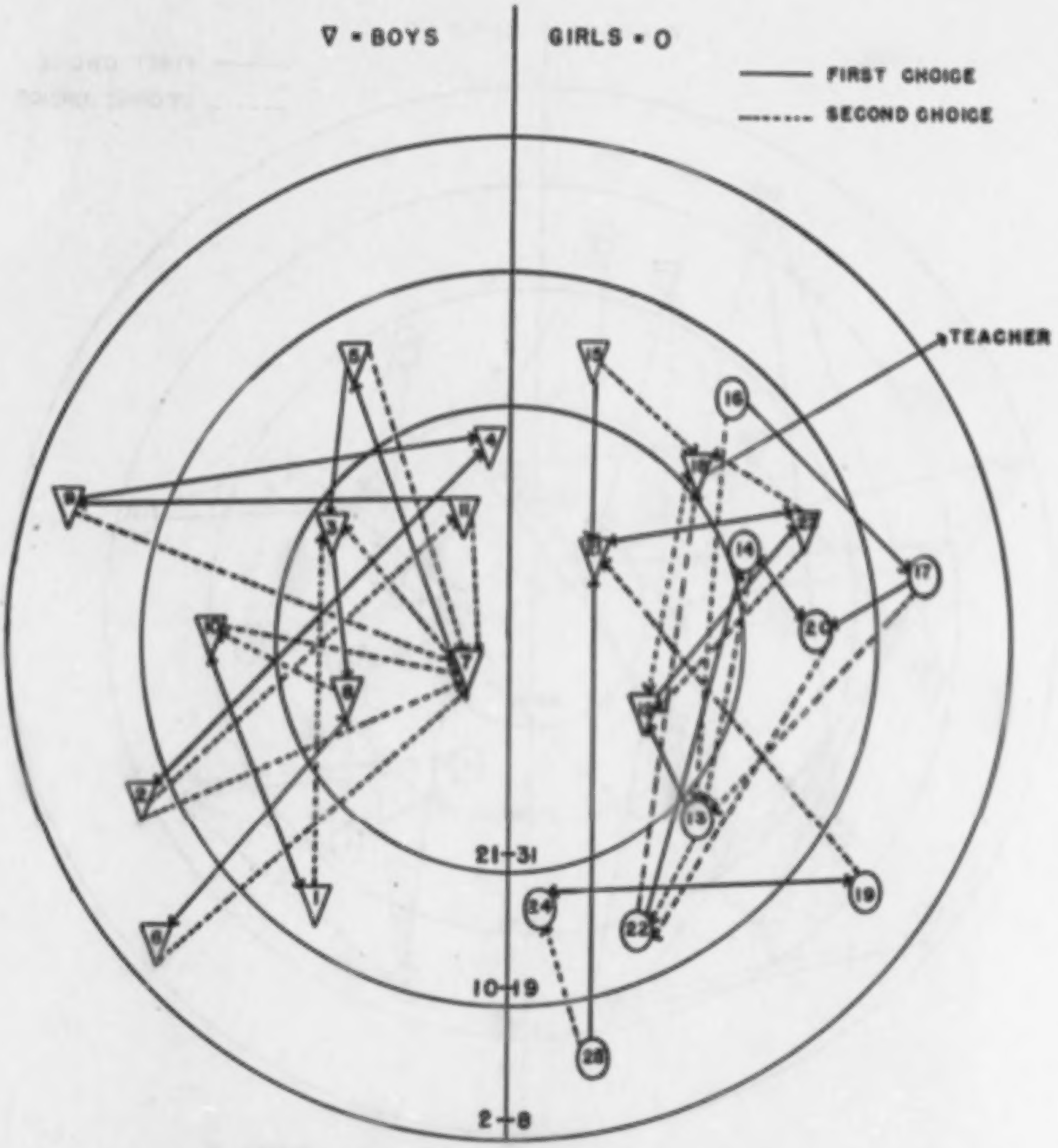
SPECIAL CLASS OF 28 PUPILS

FIG. 5

BEST FRIEND

FIRST AND SECOND CHOICES

SPECIAL


∇ = BOYS
GIRLS = O
FIRST CHOICE
SECOND CHOICE
TEACHER
21-31
10-19
2-8
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

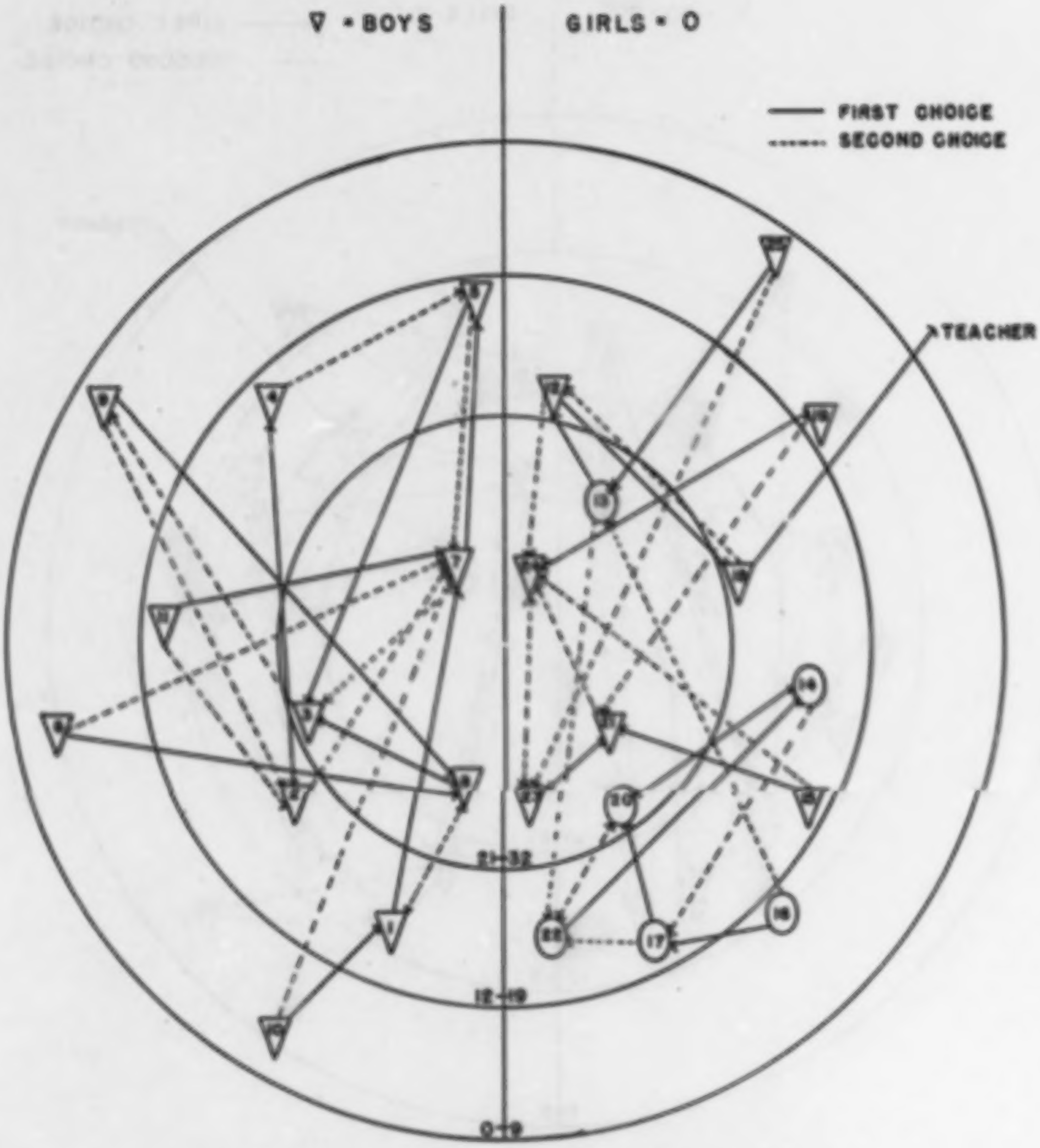
SPECIAL CLASS OF 25 PUPILS

FIG. 6

INVITE-PARTY

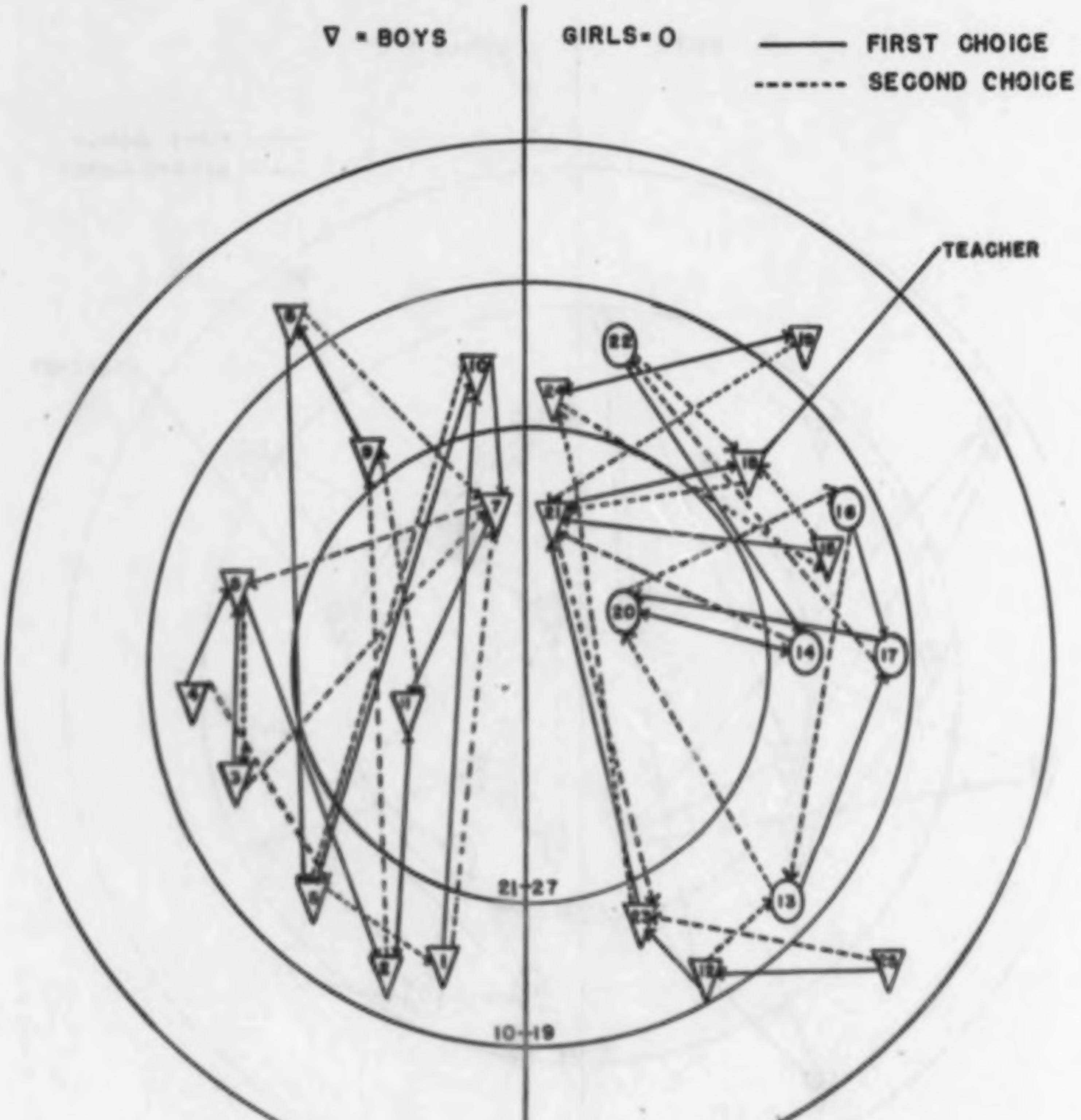
FIRST AND SECOND CHOICES

SPECIAL


∇ = BOYS
GIRLS = O
FIRST CHOICE
SECOND CHOICE
TEACHER
21-32
12-19
0-9

SPECIAL CLASS OF 25 PUPILS

FIG. 7
PLAY WITH
FIRST AND SECOND CHOICES
SPECIAL


∇ = BOYS
GIRLS = O
FIRST CHOICE
SECOND CHOICE
TEACHER
8
10
9
7
5
4
3
11
6
2
1
22
19
24
16
21
18
15
20
14
17
13
23
12
25
21-27
10-19
7-9

SPECIAL CLASS OF 25 PUPILS

members of a regular class and those made from members of the special class. Those from the regular classes are perhaps even more dispersed since there are a greater number of "isolates" in the regular class than in the special class.

These sociograms together with data appearing earlier in this discussion point to a very significant fact. Mentally handicapped children in special classes may become "stars" in that they are frequently chosen for best friends. On the other hand, mentally handicapped children as members of a regular class are never "stars" and very frequently (20-30 per cent) are complete "isolates".

Teachers' Ratings

In studying the personal-social traits of mentally handicapped children in special or in regular classes, it appeared important to obtain ratings of all children from teachers. Unable to discover any instrument which indicated the amounts of the traits we wished to study, we constructed a rating scale useful for indicating these amounts. Items were assembled, critically evaluated by our research group, and finally cast into the present form. The scale, consisting of nine rating scales and one check-list, furnished opportunity for indicating the teachers' judgment about the child's (1) emotional adjustment,(2) evaluation of his own ability,(3) happiness, (4) attitude towards school,(5) participation in the learning activities of his class, (6) number of friends,(7) social relations with other members of his class,(8) obedience to necessary class rules,(9) the child's practices in a number of undesirable behavior traits, (10) a check-list of trait characteristics liked or disliked by children when the traits were possessed by their peers. All of the items with the exception of the check-list were rated on a five-point scale.

This instrument was used by the teacher to rate the mentally handicapped children and either all the other members or else a random sample of them. Thus we were able to compare ratings of mentally handicapped children with average ratings (a) in the regular class and (b) in the special class.

When we compare the teachers' ratings of 228 children whose I.Q.'s were 76 and above with their ratings of 35 mentally handicapped children, the scores of the former were significantly higher.

	I.Q.'s above 76	I.Q.'s 50-75
Teachers' Ratings	87.8 ± 15.75	72.8 ± 13.10

The difference of 15 between the means is statistically significant ($p = .001$.) It is interesting to note that while average choices of students increased with I.Q., the teachers' ratings did not. For example, the average rating for six mentally handicapped children with I.Q.'s ranging from 50 to 59 was 69 which was identical with the average rating of five children whose I.Q.'s were 70-79.

Some further light is thrown on this matter by comparing ratings of separate items. Three comparisons are here made: (1) the comparison between rated traits of mentally handicapped children in a regular class with those of the other members of the same class,(2) the comparison of the rated traits of the mentally handicapped in special classes with those of the non-mentally handicapped in a regular class, and (3) the comparison of the rated traits of mentally handicapped in the regular classes with those of mentally handicapped in special classes. The results are summarized in Table 3.

By referring to Social Traits it is seen that the first eight traits were rated from one to five. The ninth item has ten undesirable traits which are also rated from one to five each. "Has never occurred" was rated five; "A constant problem" was rated one. Thus the highest score possible on this item was 50; the lowest, ten. Item ten was scored as follows: two points were given for each desirable trait checked, and minus one was given for each undesirable trait checked. The highest score possible was 24; the lowest score possible was -12. The highest possible rated score for the total scale was thus (1) eight items at five each, or 40,(2) one item No. 9, 50, and (3) one item at 24 or 114 in all.

TABLE 3

TEACHERS' RATINGS AND SCHOOL PLACEMENT

	1	2	3						
	Regular Class		Special						
Item	Normal	Retarded	Class	D_{1-2}	SE_{1-2}	D_{1-3}	SE_{1-3}	D_{3-2}	SE_{3-2}
1	3.32	2.29	2.72	1.03	.17	.60	.12	.43	.16
2	4.14	2.37	3.28	1.77	.21	.86	.17	.91	.21
3	3.54	2.89	3.09	.65	.16	.45	.11	.20	.15
4	3.75	2.89	3.22	.86	.16	.53	.12	.33	.16
5	3.56	1.91	3.28	1.65	.16	.28	.13	1.37	.15
6	3.95	3.26	3.59	.69	.15	.36	.10	.33	.14
7	3.56	2.74	3.11	.82	.15	.45	.09	.37	.14
8	3.91	3.06	3.19	.85	.18	.72	.09	.13	.17
9	50.00	45.36	43.97	4.64		6.03		-1.39	
10	14.40	6.45	8.46	7.95	1.11	5.94	.31	2.01	.27
Total	87.80	72.84	79.05	14.96	2.61	8.75	2.05	6.21	2.55
N	228	35	170						
S.D.	15.75	13.10	16.65						

Comparisons are presented between ratings of normal children in regular classes with ratings of mentally handicapped in special classes. As in the former comparison the ratings of children with I. Q. 's of 76 and above are clearly larger than are ratings of mentally handicapped in a special class. The differences are large enough to be acceptable with a high level of confidence. In only one case, Item 5, does the confidence level drop below .01.

In this comparison we come to grips with our major problem. How do the personal-social traits of mentally handicapped children differ when these children are members of a regular class or members of a special class? This comparison can not be made directly because it was impossible to study the same children in a regular class and in a special class. In the first place, Table 3 indicates that mentally handicapped children in a special class do on the average receive higher ratings than those in a regular class. The difference of totals of 6.21 may be accepted with a high level of confidence ($p = .02$.) Perhaps more interesting than the totals are the scores of the individual items. In all areas except in Item 9, mentally handicapped in special classes receive higher scores than do corresponding pupils in regular classes. In five areas: Item 1, emotional adjustment; Item 2, child's estimation of his own ability; Item 5, participation in learning activities; Item 7, child's participation in social activities; Item 10, possessing traits thought desirable by peers, differences in rating may be accepted at the highest level of confidence. If these ratings are sound, mentally handicapped children in special classes are emotionally better adjusted, have a higher regard for their own mental ability, participate more widely in learning and social activities and possess more traits desired by their peers than do their counterparts in regular classes. In spite of weaknesses in teacher ratings, in spite of differences in the composition of teachers who did the rating, in spite of differences in populations rated, the writer is inclined to believe that these are real differences of children brought about by differences of treatment. Item 6 indicates that the teachers believe that mentally handicapped children have a greater number of friends in the special class than when they are located in a regular class ($p = .02$) and Item 4 indicates that they have better attitudes toward school in the special class ($p = .05$). Whether or not mentally handicapped children are happier in a special class or obey rules better can not be determined from this investigation.

Mentally Handicapped in Special Classes

The population of the mentally handicapped in special classes consisted of the members of thirty classes in eight different communities. Table 4 indicates their distribution according to I. Q.

TABLE 4

SPECIAL CLASSES (N-30)
DISTRIBUTED ACCORDING TO I. Q.

I. Q.	f
90	2
85	
80	6
75	22
70	65
65	95
60	79
55	56
50	30
45	3
40	1
N	359
Mean	64. 57
S. D.	7. 60

Eight of these 359 cases with I. Q. 's above 80 do not belong in our group nor do the four whose I. Q. 's fell below 50. Thus we have 347 children whose I. Q. 's fall in our range of 50-75. The concentration of the cases between 55 and 75 as well as the smallness of the S. D. shows the concentration of cases around 65.

TABLE 5

AGES OF CHILDREN IN SPECIAL CLASSES

Months	190	180	170	160	150	140	130	120	110	100	90	80
Number of Cases	2	19	27	43	38	42	44	43	32	27	10	1

The chronological ages of our population ranged from 80 months to 190 months. The mean is 140. 5 months, while the S. D. is 12. 35. From 110 to 170 there are 30 to 40 cases at each ten month interval. The children were classified in grades 3 to 8. The size of class varied from three or four to thirty-six students.

TABLE 6

SPECIAL CLASSES - CLASS SIZE

Number	f
35	1
30	
25	3
20	3
15	5
10	2
5	13
0	3

One of our greatest difficulties in making comparisons from class to class was the large number of small classes. This did not invalidate our ratings by teachers, but it did present large problems in sociometric scores.

Childrens' Choices

There remain to be studied the personal-social relations of children in special classes. The technique used was the same as that used in the study of mentally handicapped children in the regular class. In dealing with the special classes certain difficult problems arose because the classes were of widely different sizes and in many of the classes the children were placed in the special class a part of each day and in the regular class another part of each day. Thus children listed their friends at times from the special class and again from the regular class. For these reasons it was thought best to confine our study of childrens' choices to the eight classes which were self-contained and which enrolled fifteen or more students per class. Table 7 shows the average choices for each area as well as for the three combined. Of the 172 children only one received no vote, and one child received only one vote, a fifth place. The summary in Table 8 throws some light on the problem.

TABLE 7

CHILDRENS' CHOICES

Eight Special Classes Varying in Class Size from 15 to 28

	Mean	N	S.D.
Best Friend	13.6	172	7.92
Invite to Party	13.7	172	8.01
Play With	13.0	172	6.72

TABLE 8

SUMMARY TABLE OF CHILDRENS' CHOICES (MEANS)

	Regular Class Normal	Regular Class Retarded	Special Class Retarded
Best Friend	15.35	4.14	13.6
Invite to Party	15.25	3.42	13.7
Play With	14.95	4.92	13.0
Total	45.55	12.48	40.3
Number	100	35	172

Most interesting to us are the totals of 12.48 received by the mentally handicapped in the regular class, and the 40.3 totals received in the special class. In like manner large differences in choices appear in each of the three areas. All these differences are highly significant (p = .001.). In all comparisons mentally handicapped children in special classes receive far more choices than those in regular classes.

When scores of children with I.Q.'s above 76 in regular classes are compared with scores of mentally handicapped in special classes, there are no significant differences between them. This result is undoubtedly influenced by the procedure used. In the case of students in the regular class as well as those in the special class, each student must select his friends from the population of that class of which he is a member. Averages would not be significantly different unless the children refused to name members of that class, thus not following instructions. It may be also that children become friendly with those with whom they associate.

In twenty-five classes we asked the children to write down the names of "their very best friend" wherever he was located. In this manner we could discover how many "best friends" were located in his special class and how many were located elsewhere. The results were definitely related to the size of the class.

TABLE 9

BEST FRIENDS IN SMALL CLASSES

Size of Class	N	Class	Not Class
10	2	10	10
9	4	16	20
8	3	15	9
7	4	14	14
6	4	8	16
5	1	1	4
4	2	0	8
Total	20	64	81

Table 9 indicates that best friends are chosen from children outside the class in a majority of cases when the classes are ten or under in size. But even here, 64 out of 145 choices were selected from members of the special class.

When we turn to large self-contained classes we discover a radically different picture, as indicated in Table 10. The figures in Table 10 indicate that best friends are selected from members of the special class in 83 out of 98 cases or in 84 per cent.

The evidence from childrens' choices points clearly to the following inference. Mentally handicapped children in special classes have a far greater chance of being chosen, of being accepted as friends in the special class than in the regular one.

TABLE 10

BEST FRIENDS IN FIVE SPECIAL CLASSES

Size of Class	N	Class	Not Class
28	1	22	6
20	1	20	0
17	2	28	6
16	1	13	3
Total	5	83	15

The Rating Scales

There are ten parts of the rating scale which may be abbreviated as follows:

1. Total personality.
2. Evaluation of child's mental capacity by himself.
3. Happy or unhappy.
4. Child's attitude towards school.
5. Participation of child in learning activities of school.
6. Number of friends.
7. Child's social relations with his classmates.
8. Obedience to necessary rules of conduct.
9. Frequency of occurrence of cheating, lying, defiance of discipline, temper outbursts, etc.
10. List of desirable and undesirable traits.

Each of the first nine items was rated on a five point scale, while the tenth was a check list.

Validity and Reliability of the Scales

The correlations now reported were computed from 100 records of pupils located in regular classes in which there were from one to three mentally handicapped. Item nine had to be treated somewhat differently from the others because in 64 per cent of the cases the children were rated "has never occurred" on each of the ten undesirable traits. It seemed feasible, therefore, to use the biserial r between "has never occurred" and "has occurred at least once" and the total rated score for each child. Item ten had such a high correlation with the total rating that it was correlated with the sum of items one to nine with item ten omitted. But even

TABLE 11

CORRELATION OF ITEMS WITH TOTAL RATINGS

Items	Total Ratings
1	.41
2	.24
3	.51
4	.50
5	.47
6	.51
7	
8	.48
9	.49
10	.92 (Biserial *r*)

under these conditions the coefficient was .75.

The accuracy of the instrument was not reliably determined by its repetition with the same children. One Kuder-Richardson formula produced an *r* of .83.

The relation between total rating scores and intelligence test scores was computed. The coefficients hovered around .50. As an example, in one population of 97 cases composed of two third grades and one fourth, the correlation was .51.

The question arises as to the correlations between the different areas of our sociometric technique.

	Best Friend	Invite to Party	Play with at Recess
Best Friend		.74	.70
Invite to Party	.74		.70
Play with at Recess	.70	.70	

These coefficients indicate a high degree of resemblance between the three areas. In many cases a child would select the same five children for best friends and to invite to a party.

In their choices of friends children seemed less influenced by the intelligence of their friends than did teachers in their ratings for the correlation between I. Q., and the sum of the childrens' choices turned out to be .37 in one case and .42 in another.

We have also studied the relation between the ratings of teachers of personal social traits and childrens' choices of friends. The coefficient of correlation between total ratings and total choices ranged between .40 and .50. When we used the three areas the results were:

	Total Ratings
Best Friend	.43
Invite to Party	.42
Play with at Recess	.46

These correlations were so important that the author made a scattergram of them. The results were indeed surprising. The lower left hand quadrant showed substantial agreement between low ratings and low choices.

In sharp contrast to these findings the high ratings were scattered almost by chance among the high, low, and middle choices. In general there was close agreement among the low ratings and choices but practically none among the high. The correlations between items and total choices are shown in Table 12.

We were especially interested in Item 6 because the teacher was asked to estimate the number of friends each child had. It thus seemed that a very direct comparison could be made in this case. The correlation of .55 does show a substantial agreement between Item 6 and Childrens' Choices.

In conclusion, teachers' estimates of personal social traits agree with childrens' choices in the lower half of the rating scale but do not agree in the upper half. Teachers' estimates of the number of friends a child has agree fairly well with the votes he receives from his friends.

TABLE 12

CORRELATIONS BETWEEN RATED ITEMS AND TOTAL CHOICES

Items (Rated)	Total Choices	
1.	.52	
2.	.35	
3.	.51	
4.	.42	
5.	.48	
6.	.55	
7.	.52	
8.	.32	
9.	.17	(biserial r)
10.	.45	

Summary

The purpose of this part of the total study of the learning of handicapped children was to investigate the personal-social traits of mentally handicapped children as they were found in the regular class and in the special class. Two techniques were employed. In one, the children listed the names of their friends from the members of their class. In the other, teachers rated the traits that each child possessed.

In both procedures the results were in close agreement. Mentally handicapped children in regular classes are not as a rule chosen as friends by other members of the class. A considerable per cent of them receive no choices at all, and it is rare indeed for a handicapped child to receive as many votes as the average child of a class. Mentally handicapped children fare much better in the special class. They are more frequently chosen as friends and only rarely does a child receive no votes. Even when children had a chance to select the names of their friends from any population, they selected them as a rule from the membership of the special class if it was self-contained.

The second method, teachers' ratings, agreed substantially with the first procedure. Personal-social traits of handicapped children were rated higher in special classes than in regular classes. When all ten items were considered, the difference in favor of the special class was significant ($p = .02.$). Among the items ratings of total personality, participation in school activities, the manner in which a child evaluated his own mental ability, the entrance of a child in social relations, and the possession of traits judged desirable by his peers were all rated significantly higher in the special class. As might have been suspected children whose I. Q. 's were 76 and above were rated higher than mentally handicapped wherever found.

Teachers' ratings and childrens' choices agreed fairly well. They were closest in agreement in the case of children who were rated low and practically in no agreement among children who rated high.

SECTION VIII

GROSS MOTOR SKILLS OF MENTALLY HANDICAPPED CHILDREN*

Problem

Statement

The purposes of this phase of the study were:

1. To measure the ability of mentally retarded children to perform selected gross motor skills.

2. To compare the gross motor achievement in these skills of the mentally retarded children with the gross motor achievement of normal children of the same sex and of relatively the same age.

3. To determine the statistical significance of the differences in achievement.

Scope of the Study

The scope of the project should be kept in mind. The following statements explain the range and the limitations of the study.

1. The subjects used were white children in the age range seven through fifteen.

2. The mentally retarded subjects ranged from 50 through 79 in intelligence as determined by the Binet test and were, with a few exceptions, in special education classes in the public schools of North Carolina.

3. The normal subjects were students in the public schools in North Carolina exclusive of students registered in special education classes.

4. Statistical comparisons were calculated between normal and mentally retarded children who were classified according to chronological age and to sex.

5. It was necessary to pool the subjects in age groups seven, eight, and nine because of the small number of mentally retarded children in each of these age groups.

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*This section of the report was prepared by Professor William H. Peacock, Department of Physical Education, University of North Carolina.

6. The stabilities of the statistical measures calculated for the normal twelve year old girls are subject to question in view of the size of the sample.

7. The normal children were tested by former graduate students of the investigator.

Collection of Data

Test Items

Two test batteries of eight items each were developed to measure selected gross motor skills. The first battery was for children of ages seven through nine and consisted of the following items:

1. Tennis ball throw for distance.
2. Volley ball punt for distance.
3. Standing broad jump.
4. Tennis ball throw for accuracy (Distance 4 feet, 6 feet, 8 feet).
5. Side stepping (15 seconds).
6. Forty-yard run.
7. Strength of right grip.
8. Strength of left grip.

The second battery was for students whose ages ranged from ten through fifteen years. The test items were the same as those for the first battery except that a soft ball was used for item one, and a soccer ball was used for item two. The distances in the accuracy throw, item four, were 4 feet, 8 feet, and 12 feet.

Both test batteries were administered to a pilot group of mentally retarded children in the appropriate age groups, and it was found that the directions for the administration of the test items were understood by the subjects. It was also found that mentally retarded children could perform the test items.

Reliabilities of the test items were determined by the test-retest procedure using normal seven year old children and were found to range from .81 to .97. These reliabilities were in line with results found by other investigators.

Subjects

There were 559 mentally retarded students, 347 boys and 212 girls, tested in this investigation. They ranged in age from seven years through fifteen years, and their intelligence quotients ranged from 50 to 79 as determined by the Binet test. The communities where these students attended school and the number of students in each community (number in parenthesis) were Charlotte (102), Wake County (101), Greensboro (78), Raleigh (54), Burlington (43), Goldsboro (39), Greenville (32), Reidsville (20), Hillsboro (10), Durham County (6), and Caswell Training School (74).

The number of normal children tested was 2,825. There were 1604 boys and 1221 girls. Their age range was seven through fifteen. These students attended school in rural as well as in urban areas. They were also well distributed geographically including schools located in the mountains, in the Piedmont, and in the coastal plain area of North Carolina.

Test Administration

The mentally retarded children were tested by the investigator. These children, in so far as could be determined by the tester, were not handicapped by orthopedic or other physical defects. Detailed instructions for the administration of the test items may be found in Appendix A. Data were recorded on printed forms. Copies of these forms are also in Appendix A.

In the case of the normal group former graduate students of the investigator who were teaching in the public schools carried on the testing. All of these students were instructed in the methods of administering these tests by the investigator, most of them being in his class in a summer session. The data were recorded on printed forms and returned to the investigator.

Organization and Procedure

Organization of Data

Both the data for the normal subjects and for the mentally retarded groups were punched on standard I. B. M. data processing cards. These cards were then sorted and distributions of discrete numbers were then set up for each of the test items according to age and sex categories.

Statistical Procedure

The means and sum of squares for the various distributions were calculated, and from these data mean and standard deviation scores were derived. Differences between the mean scores on the various test items for the mentally retarded group and for the normal group of the same chronological age and sex were found. To determine the statistical significance of these differences critical ratios were determined.

Ten deviation "T" scales were calculated from the data concerned with each test item for the normal children. These "T" scales were classified into age and sex categories.

The test scores on each item for the mentally retarded children were then converted to "T" scores using the normal scales, and a summation "T" score for the eight test items was derived. An average "T" score was then calculated by dividing the summation score by eight. Distributions of these average "T" scores were then tabulated according to age and sex.

Graphs

Line graphs depicting the achievements of both retarded and normal children on each test item by age and sex categories were drawn.

Analysis of Data

Statistical Analysis

As indicated above because of the few mentally retarded subjects in the age groups seven, eight, and nine, it was necessary to pool these age groups in order to make comparisons with the achievements of normal children in the same age group on the various test items. Mean scores and standard deviations for every test item were calculated for each sub group in each age and sex category. These data as well as the size of each sample are shown in Tables 1 through 14.

To determine the statistical significance of the differences between mean scores for the mentally retarded and normal groups on the several test items, as well as the age in months, height in inches, and weight in pounds for the age and sex categories, critical ratios were derived for each comparison. These data are shown in Tables 1 through 14.

It is interesting to note that in the pooled group of seven, eight, and nine year olds the mentally retarded boys and girls have higher mean ages, but their mean scores on the test items other than the strength items are inferior.

For the age groups ten through fifteen the normal boys and girls have higher mean weights and mean heights than the retarded groups. In the case of the boys the differences are statistically significant, with the exception of weight for the ten year olds, at the two per cent level or less.

The comparisons for the several test items reveal that the normal child is superior to the mentally retarded child of relatively the same age and sex.

When comparisons are made for boys, Tables 1-7, one finds that the normal age groups are significantly superior (less than the five per cent level)* in forty-seven of the fifty-six differences. The comparisons for the girls, Tables 8-14, are statistically significant (less than five per cent level) in thirty-seven of fifty-six examples in favor of the normal group. For both boys and girls the pattern is consistent, with four exceptions, in that the differences of mean scores favor the normal child and are significant at the .001 per cent level for the punt for distance, 40-yard dash, side stepping, and standing broad jump.

When the ball throw for distance, ball throw for accuracy, and strength of grip are considered, the differences of the mean scores favor the normals. However, the pattern of significance level is not consistent.

Graphs

Line graphs were drawn to facilitate the pictorial comparisons of the gross motor skills of normal children as compared with mentally retarded children of the same sex and of relatively the same age. Figures 1 through 8 present the mean scores on the various test items for boys and Figures 9 through 16 present similar data for the girls. The age range in each of the graphs is limited to ages ten through fifteen because the same test items were administered to these subjects.

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*There are less than five chances in 100 that this difference could be due to chance.

It will be noted that the profiles for boys illustrating retarded and normal data in the Graphs 1 through 8 are quite similar. This is not true of the profiles dealing with the accuracy throw and grip strength.

Somewhat the same situation is true when the profiles for the girls are studied. However, the similarity is not as marked as it is in the case of boys. Profiles dealing with the accuracy throw and grip strength are quite divergent.

The profiles for both mentally retarded and normal children indicate as a general trend that an increase in chronological age is accompanied by an increase in achievement in the motor skills tested.

"T" Scores

Ten deviation McCall "T" scales were calculated for each of the test items using the data collected for the normal boys and normal girls. These scales may be found in Appendix B, Tables 1 through 16. There is a table for each test item with separate "T" scales for age groups seven through fifteen. The size of the sample for each age group is also shown.

Using the "T" scales derived from achievements of normal children, a composite "T" score which was the sum of the "T" scores on the eight different test items was then calculated for each of the mentally retarded subjects who had test scores on all of the test items. This summation "T" score was then divided by eight to obtain an average score. The distributions of these average scores are shown in Tables 15 and 16 . The data are organized into age and sex categories, and the size of each sub age group is indicated.

It is interesting to note that only fifty-three out of 325 mentally retarded boys achieved a score (an average of his "T" scores on the eight test items) greater than fifty, whereas twenty-one of them made scores less than thirty.

In the case of the girls, twenty-six out of 197 earned a score of fifty or better, and only four were below thirty.

When the mean scores were calculated for each of the age and sex groups, it was found that only one age group had a mean score greater than fifty. The size of the sample was so small in this group that little confidence can be placed in this statistic. The patterns of the mean scores in Tables 15 and 16 are fairly constant ranging in most cases from forty to forty-five, with the scores for the girls being a little higher than those for the boys. This difference may be because of the larger sample size in the age groups for the boys.

Summary

The purposes of the gross motor skills phase of the total research project were:

1. To measure the ability of mentally retarded children to perform a battery of select gross motor skills.
2. To compare the gross motor achievements in these skills of the mentally retarded children with the gross motor achievement of normal children of the same sex and of relatively the same age.
3. To determine the statistical significance of the differences in achievement.

To achieve these purposes, 559 mentally retarded students, ages seven through fifteen, were tested with an eight item battery of gross motor skills. These students had an I.Q. range of 50 to 79.

The number of normal children in the same age range tested was 2,825. Norms, in the form of ten deviation "T" scales, were derived from these data and tabulated for each age and sex group.

With age held approximately the same, comparisons between the mean scores for the ball throw for distance, ball punt for distance, standing broad jump, accuracy throw with a ball, side stepping, forty-yard run, strength of right grip, strength of left grip are definitely in favor of the normal children over the mentally retarded children.

These differences between the mean achievement scores of the normal children over the mentally retarded children for the several age and sex groups on the test items were not accounted for by chance errors in that the "p" values for 95 out of the 122 comparisons were significant at the five per cent level or less. Sixty-seven of these 95 differences were significant at the .1 per cent level of significance.

The superiority of the normal groups over the mentally retarded in terms of mean achievement scores on the eight test items was further demonstrated by the graphical representation of the data. Profiles for both boys and girls in the age range of ten through fifteen clearly indicated the higher achievements of the normal children.

The lower mean achievement of the mentally retarded children is also indicated when the means of the average "T" scores for the eight test items are considered. These mean scores for the boys ranged from 39.7 to 43.0 when age groups nine through fifteen were used. In the case of the mentally retarded girls the range was 40.7 to 45.2. The theoretical average as derived from the "T" scales would be 50 if the retarded children were equal on the average to the normal children.

Conclusion

In this study the normal children were superior to mentally retarded children in their mean achievement on all eight selected gross motor skill items tested.

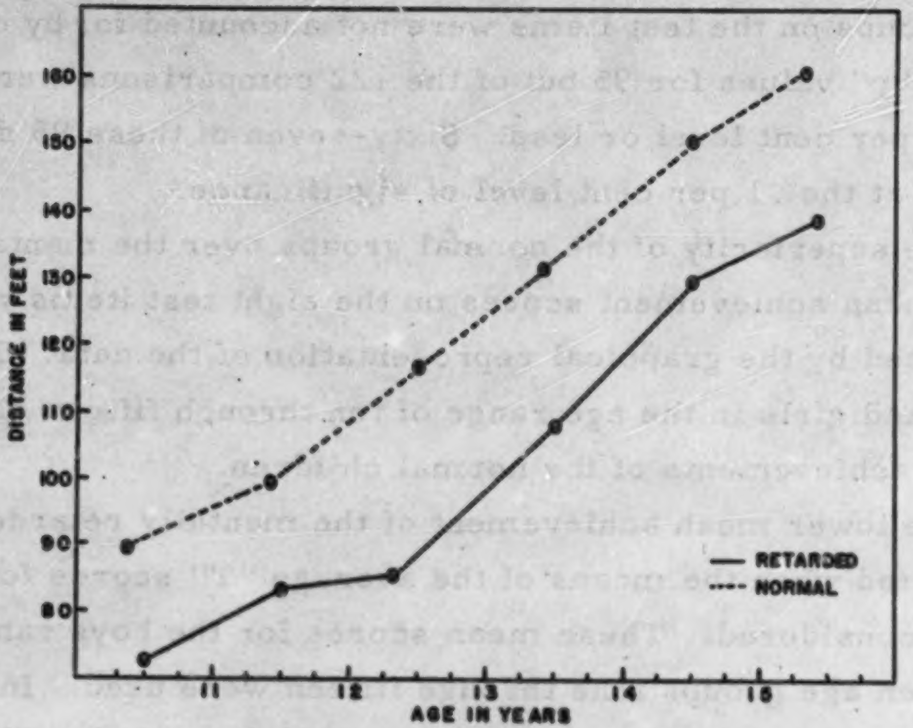

FIG. I
SOFTBALL THROW FOR DISTANCE
MEAN SCORES
BOYS

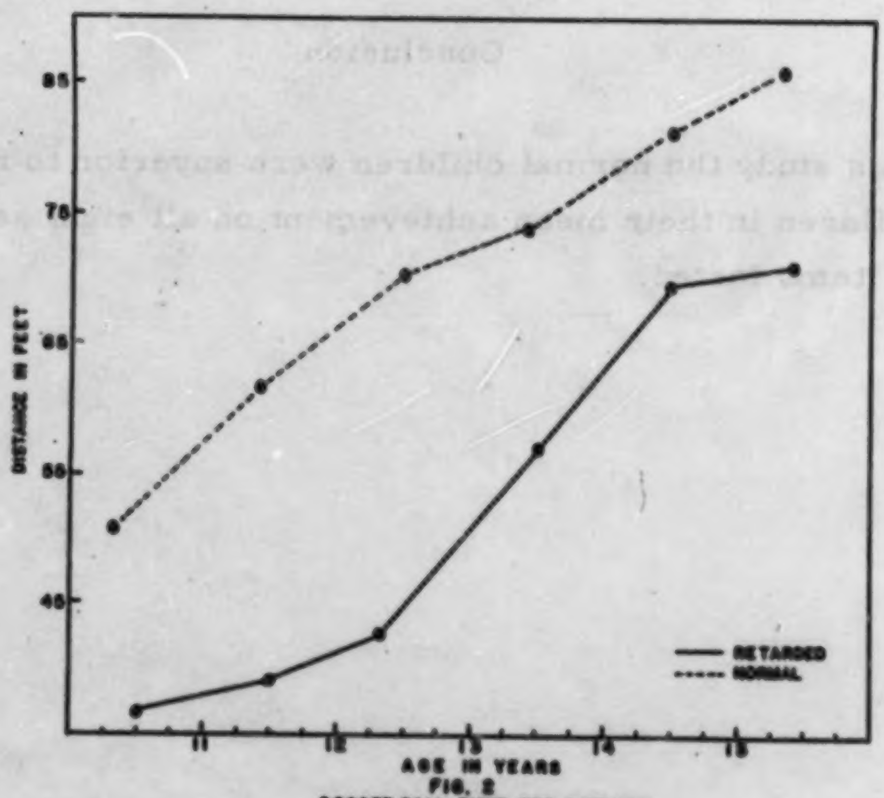

FIG. 2
SOCCER BALL PUNT FOR DISTANCE
MEAN SCORES
BOYS

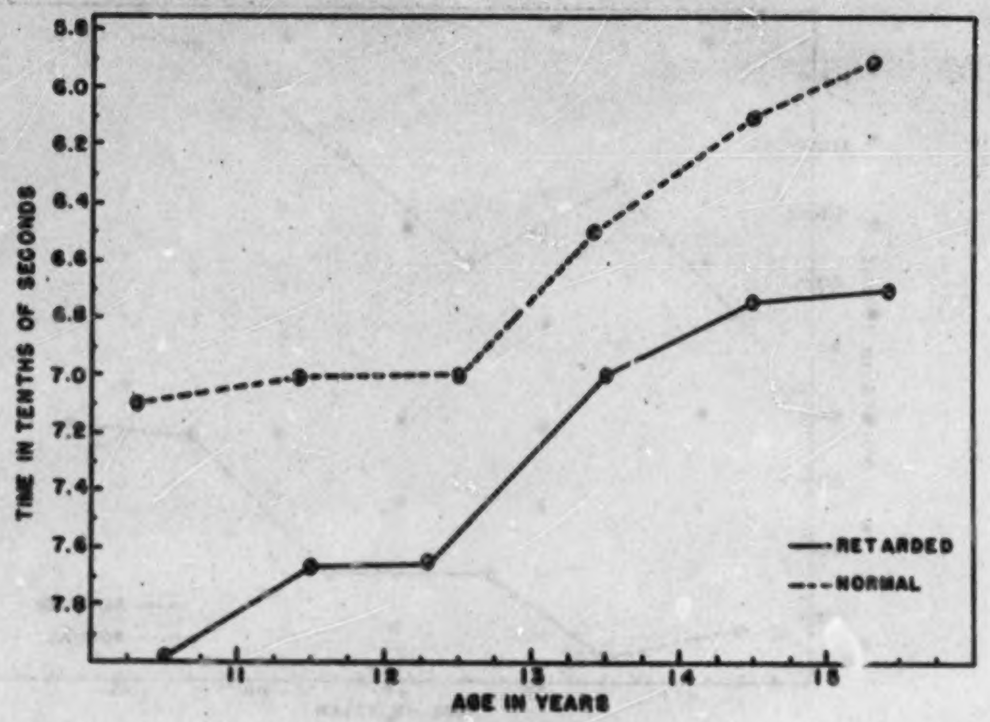

FIG. 3
FORTY YARD DASH
MEAN SCORES
BOYS

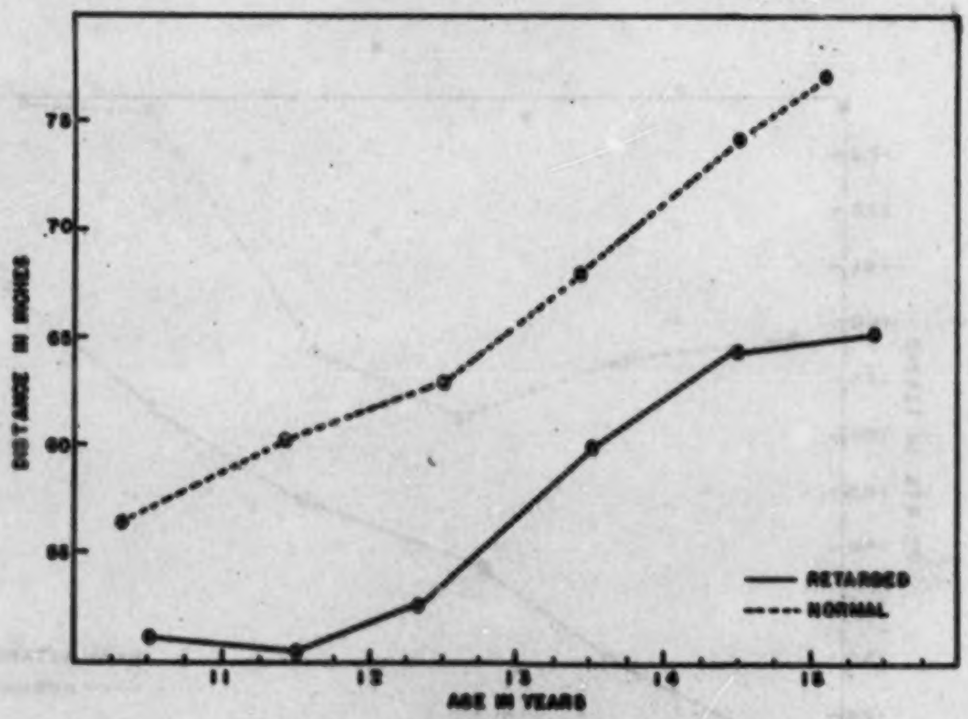

FIG. 4
STANDING BROAD JUMP
MEAN SCORES
BOYS

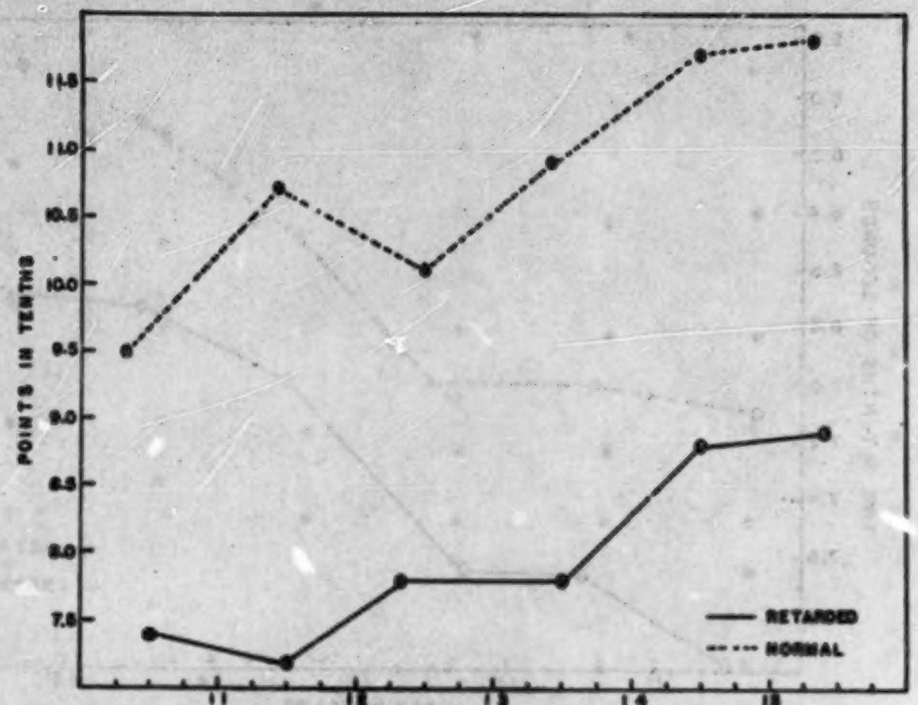

FIG. 5
SIDE STEPPING
MEAN SCORES
BOYS

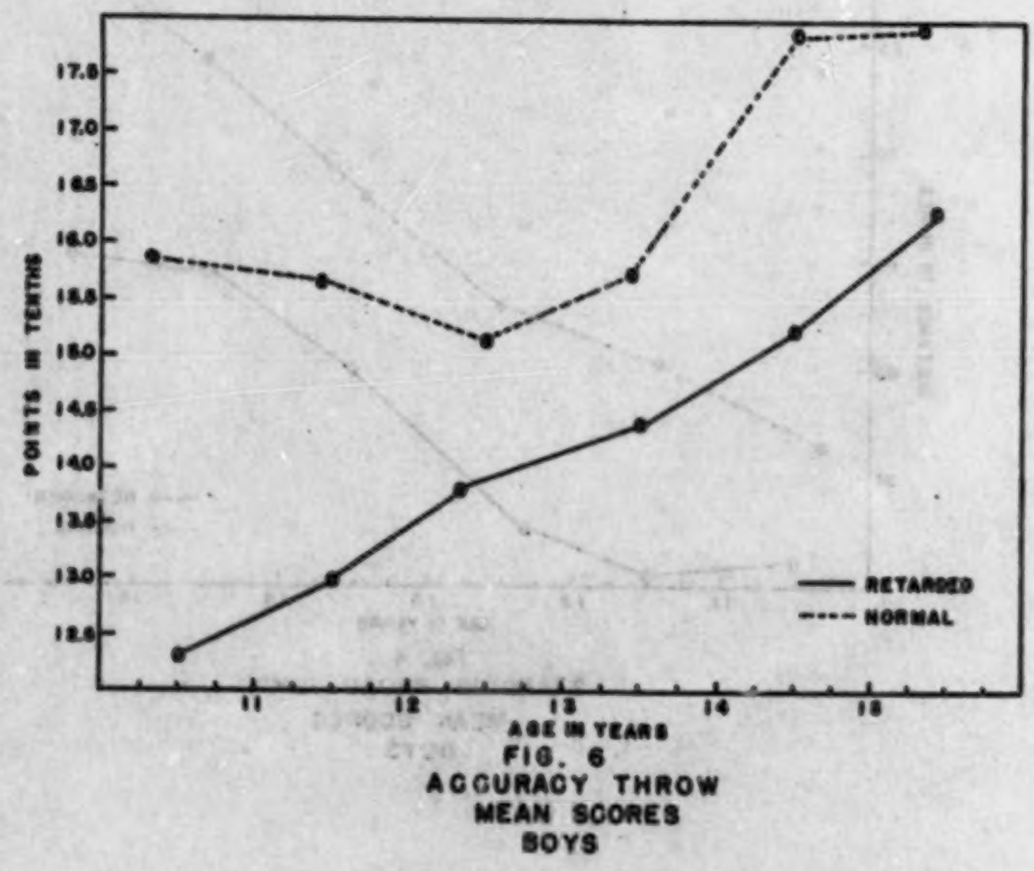

FIG. 6
ACCURACY THROW
MEAN SCORES
BOYS

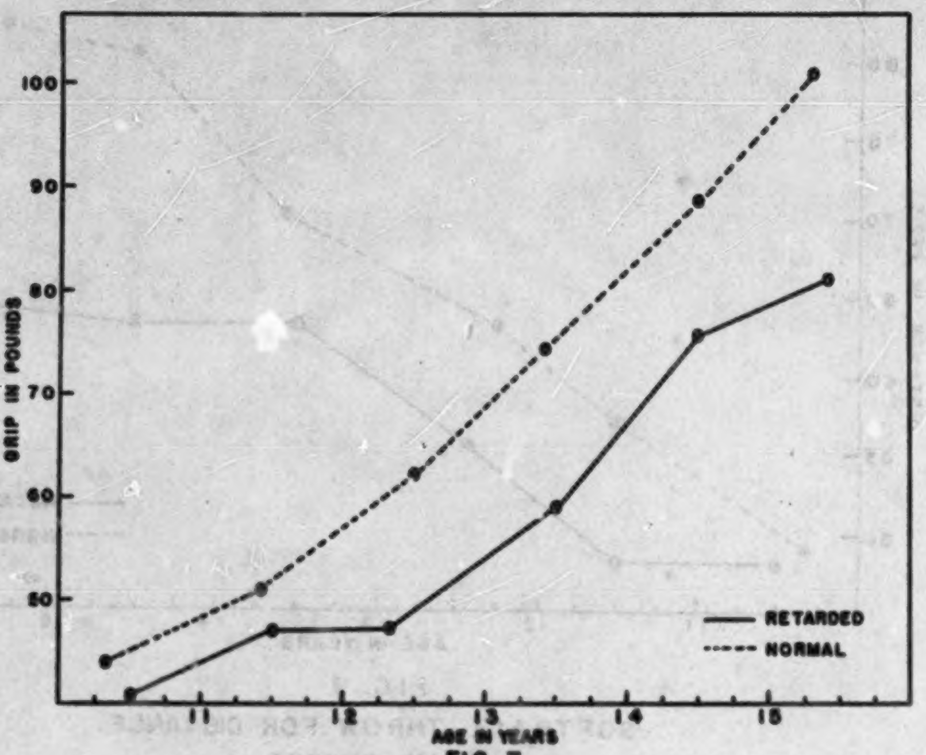

FIG. 7
RIGHT GRIP
MEAN SCORES
BOYS

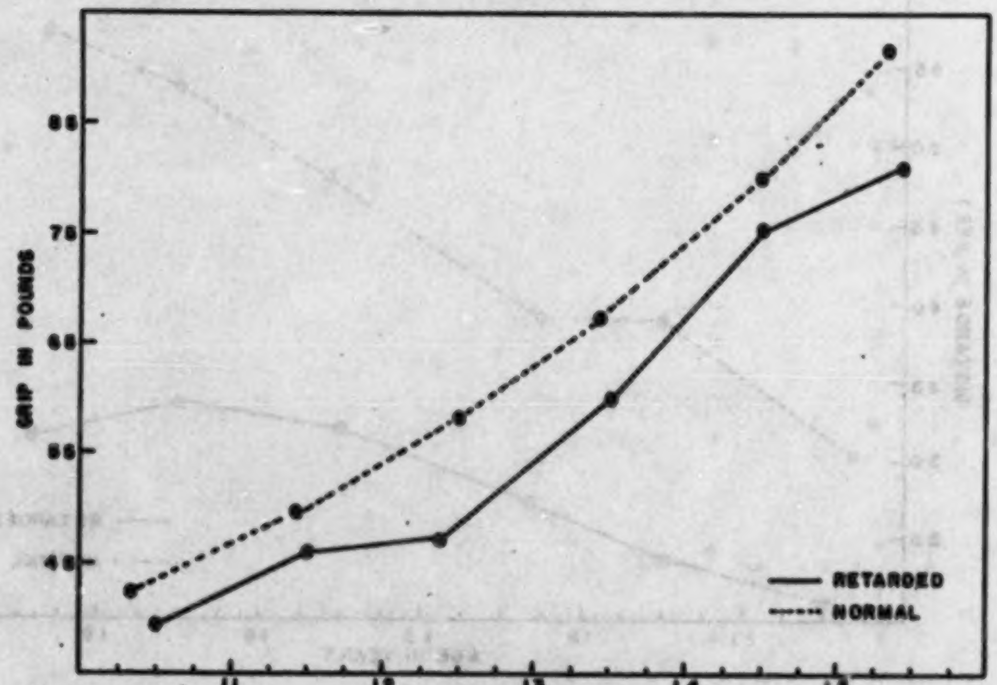

FIG. 8
LEFT GRIP
MEAN SCORES
BOYS

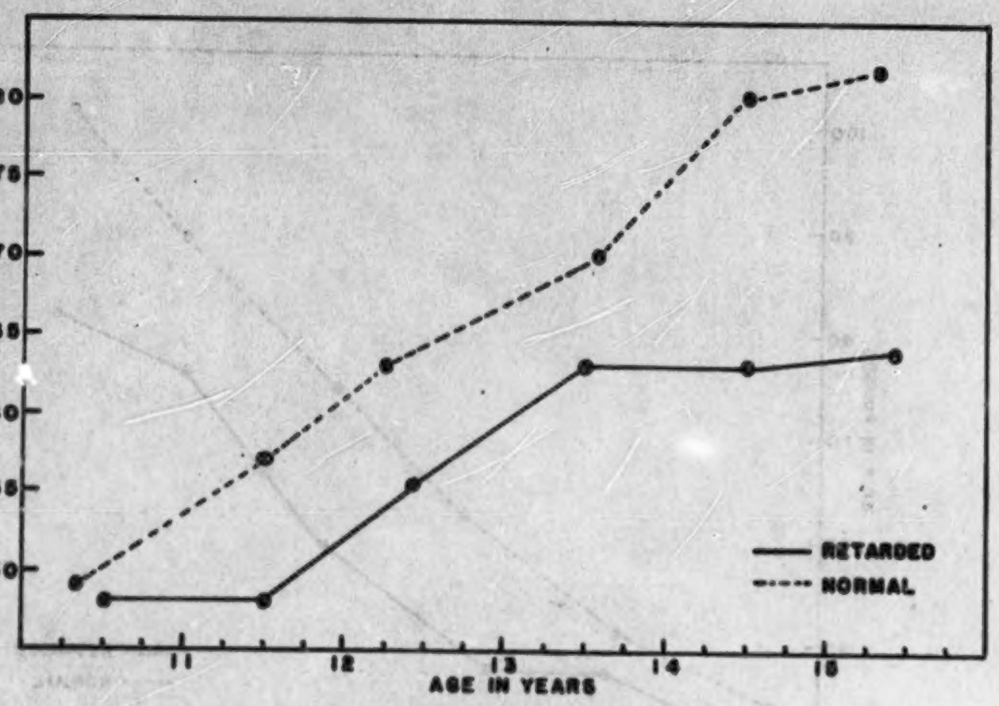

FIG. 9
SOFTBALL THROW FOR DISTANCE
MEAN SCORES
GIRLS

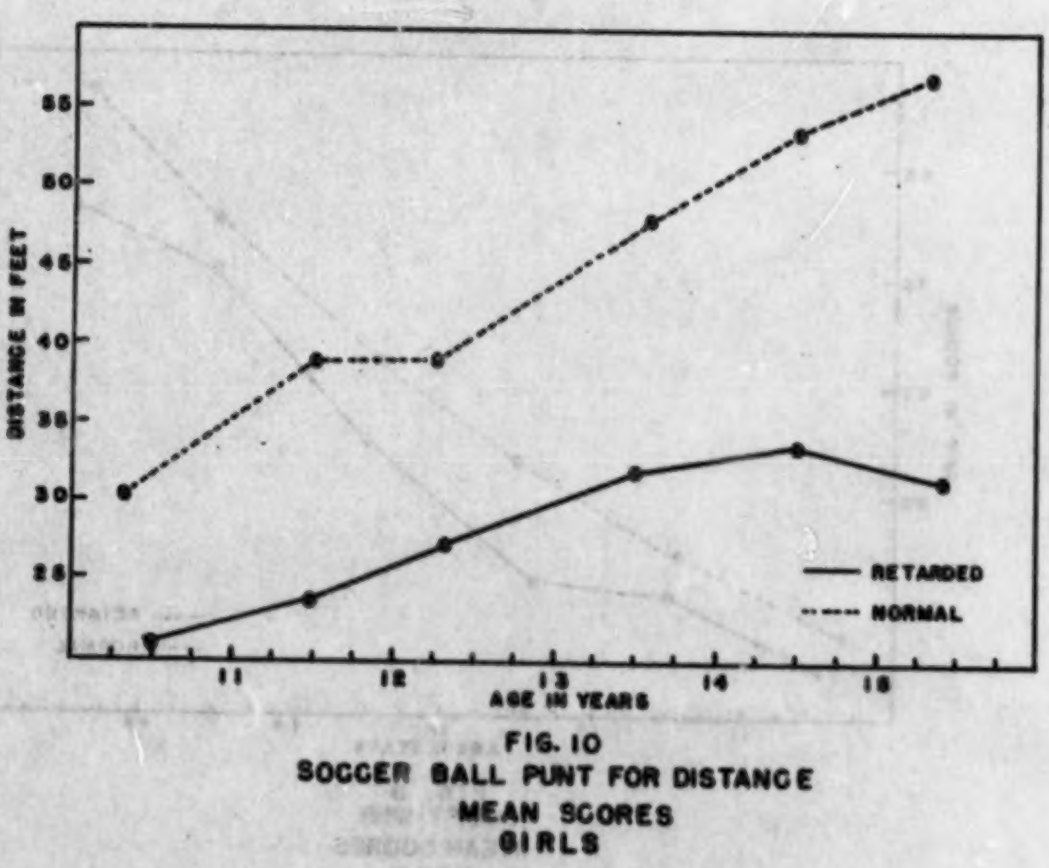

FIG. 10
SOCCER BALL PUNT FOR DISTANCE
MEAN SCORES
GIRLS

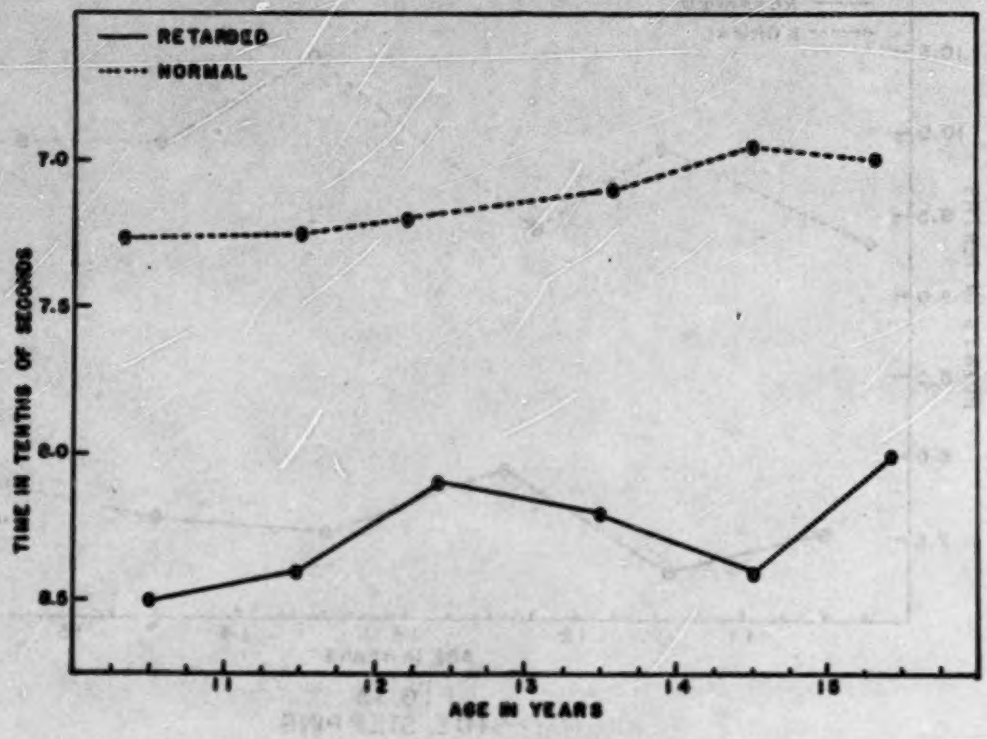

FIG. 11
FORTY YARD DASH
MEAN SCORES
GIRLS

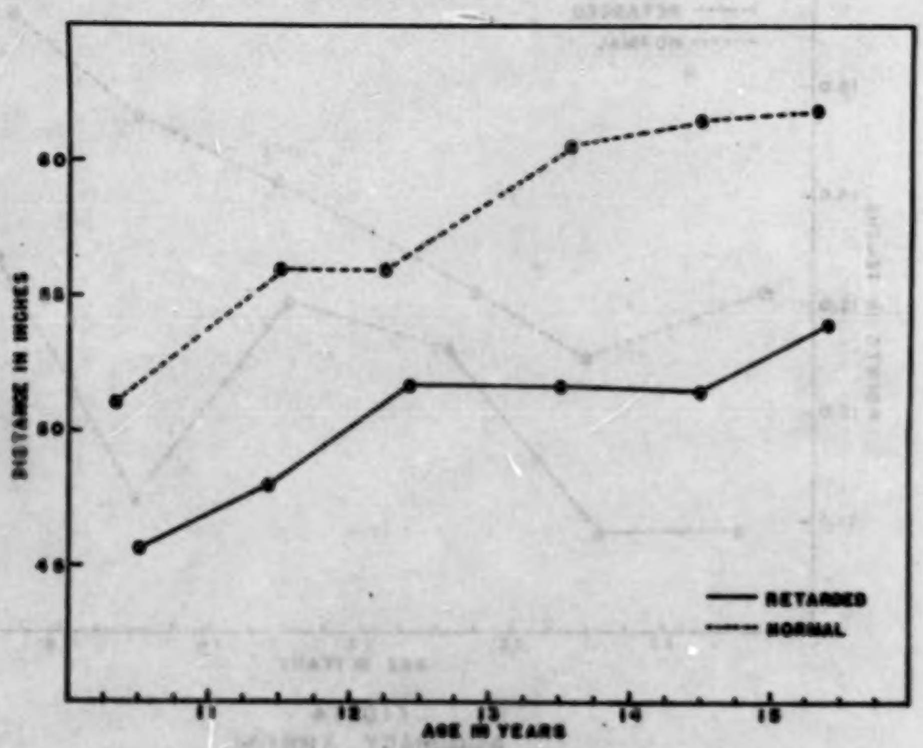

FIG. 12
STANDING BROAD JUMP
MEAN SCORES
GIRLS

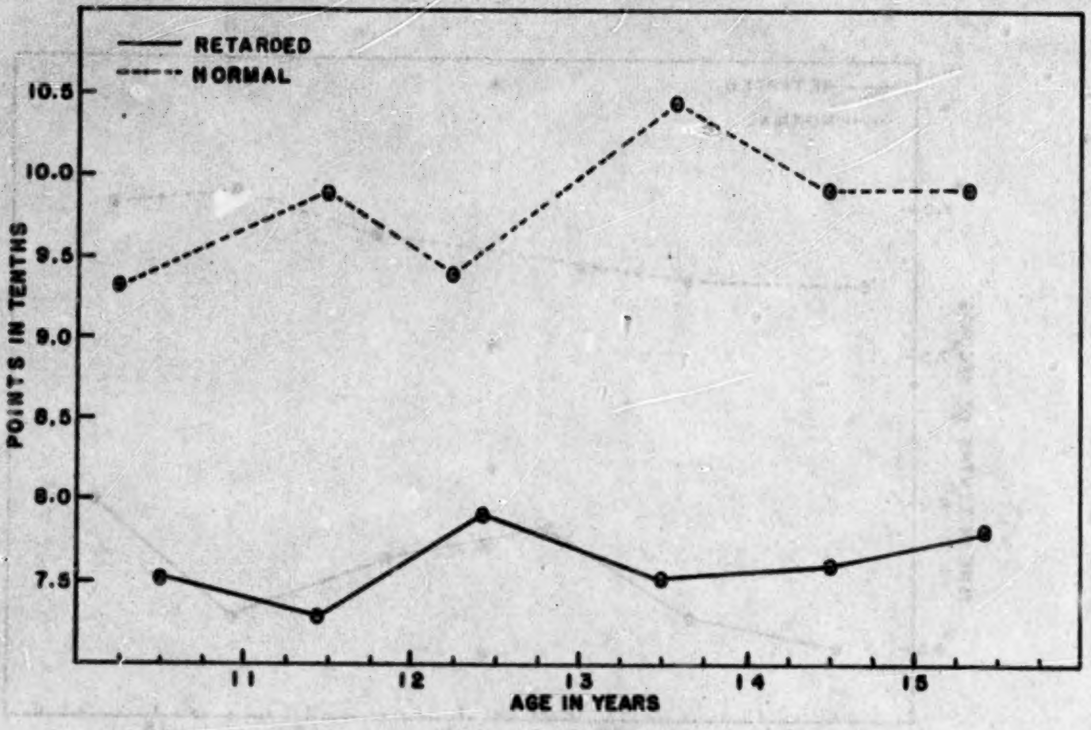

FIG. 13
SIDE STEPPING
MEAN SCORES
GIRLS

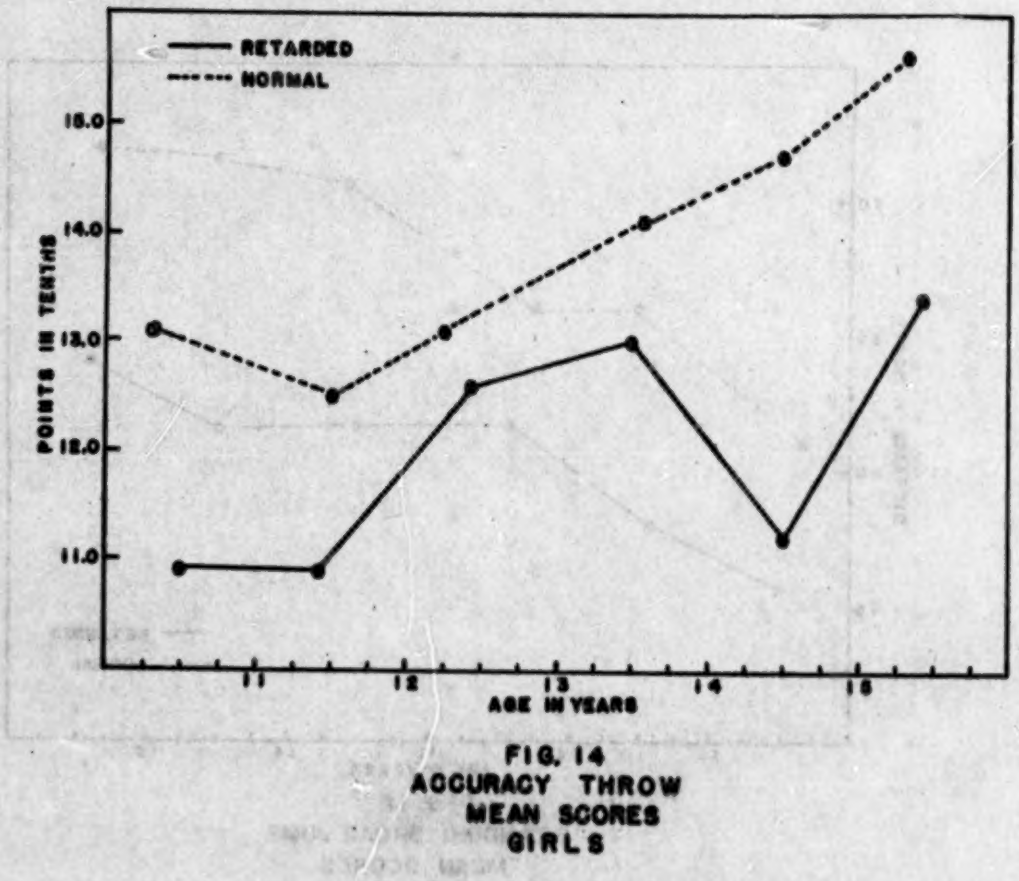

FIG. 14
ACCURACY THROW
MEAN SCORES
GIRLS

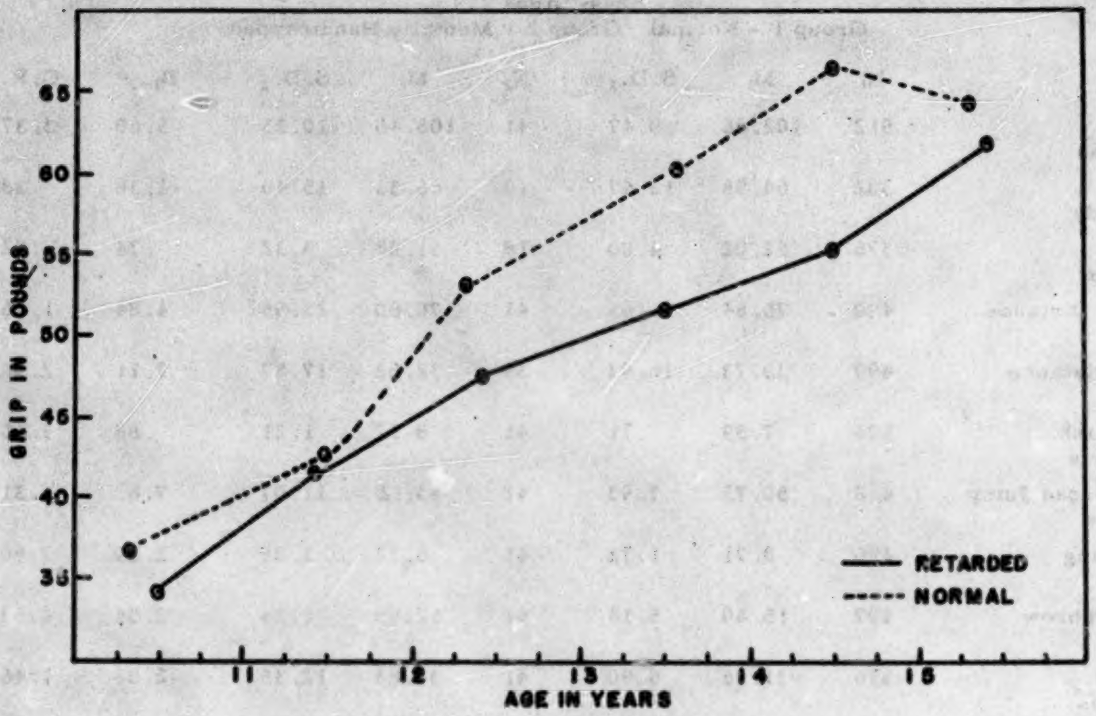

FIG. 15
RIGHT GRIP
MEAN SCORES
GIRLS

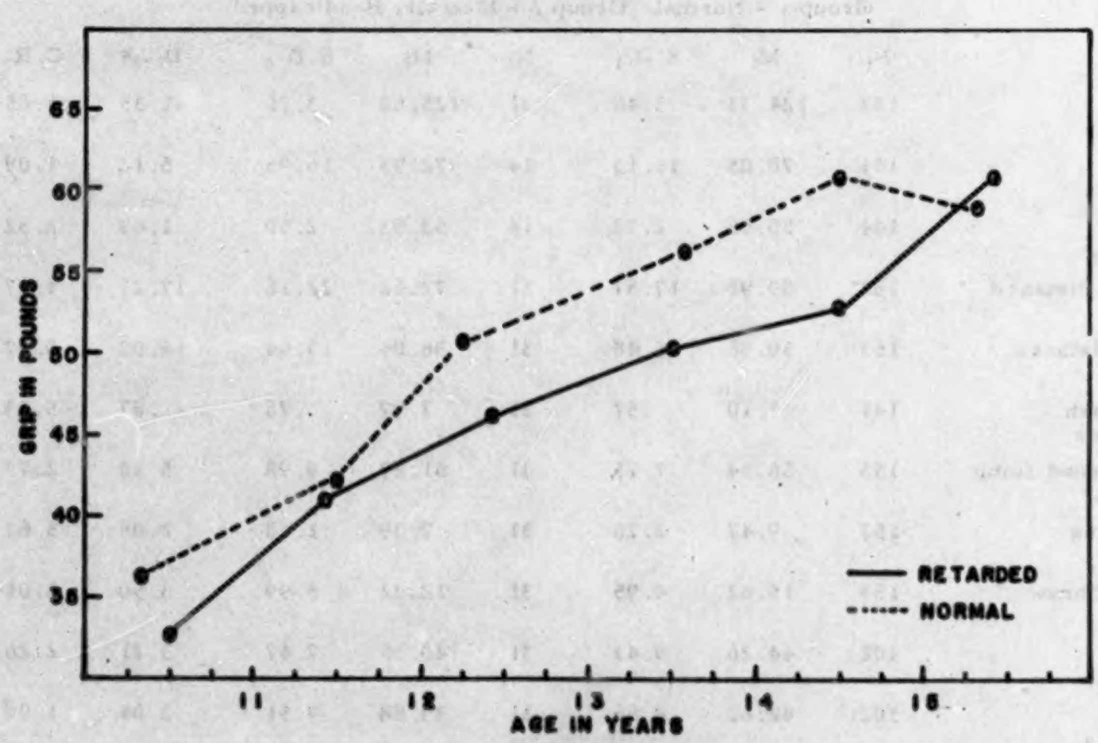

FIG. 16
LEFT GRIP
MEAN SCORES
GIRLS

GROUP COMPARISONS ON PHYSICAL TESTS

Table 1
Boys: Ages 7-9
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	512	102.86	9.47	41	108.46	10.25	-5.60	3.37	.001
Weight - Pounds	382	64.95	12.47	18	66.33	15.40	-1.38	.38	----
Height - Inches	375	52.02	4.00	18	51.28	3.32	.74	.92	----
Throw for Distance - Feet	490	75.64	21.65	41	70.80	25.95	4.84	1.16	----
Punt for Distance - Feet	499	39.73	16.93	39	3[illegible].62	17.87	7.11	2.40	.02
40 Yard Dash - Seconds	504	7.89	.71	41	8.57	1.21	.68	3.60	.001
Standing Broad Jump - Inches	488	50.75	7.93	41	43.12	11.07	7.63	4.31	.001
Side Stepping - Score	496	8.71	1.72	41	6.32	1.80	2.39	7.90	.001
Accuracy Throw - Hits	497	15.49	5.14	41	12.95	6.24	2.54	2.53	.02
Right Grip - Pounds	376	31.95	8.90	41	34.83	12.35	-2.88	1.46	----
Left Grip - Pounds	376	31.82	8.65	41	36.12	10.50	-4.30	2.53	.02

Table 2
Boys: Age 10
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	153	124.33	3.46	31	125.68	3.75	-1.35	1.85	----
Weight - Pounds	144	78.05	15.13	14	72.93	16.95	5.12	1.09	----
Height - Inches	144	55.56	2.72	14	53.93	2.50	1.63	2.32	.02
Throw for Distance - Feet	152	89.95	17.87	31	72.68	22.16	17.27	4.07	.001
Punt for Distance - Feet	153	50.86	15.48	31	36.84	13.04	14.02	5.27	.001
40 Yard Dash - Seconds	141	7.10	.57	31	7.97	.78	.87	5.83	.001
Standing Broad Jump - Inches	153	56.54	7.11	31	51.29	9.98	5.25	2.79	.01
Side Stepping - Score	153	9.47	2.26	31	7.39	1.78	2.08	5.63	.001
Accuracy Throw - Hits	153	15.82	4.95	31	12.32	5.99	3.50	3.04	.01
Right Grip - Pounds	102	44.26	9.43	31	40.55	7.47	3.71	2.26	.03
Left Grip - Pounds	102	42.62	8.66	31	39.58	7.51	3.04	1.90	----

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 3
Boys: Age 11
Group 1 - Normal   Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	122	137.12	3.53	43	137.63	3.72	- .51	.78	----
Weight - Pounds	121	85.25	15.77	22	77.86	13.02	7.39	2.36	.02
Height - Inches	121	58.43	2.87	22	56.50	3.08	1.93	2.91	.01
Throw for Distance - Feet	122	99.35	21.21	43	83.16	29.87	16.19	3.27	.01
Punt for Distance - Feet	122	61.60	16.60	42	39.29	19.65	22.31	6.60	.001
40 Yard Dash - Seconds	102	6.96	.61	42	7.67	.85	.71	4.90	.001
Standing Broad Jump - Inches	122	60.28	7.37	42	50.38	10.34	9.90	5.72	.001
Side Stepping - Score	122	10.78	2.11	42	7.26	1.93	3.52	9.96	.001
Accuracy Throw - Hits	122	15.66	4.85	43	13.09	5.40	2.57	2.76	.01
Right Grip - Pounds	120	51.04	11.16	42	47.43	12.32	3.61	1.67	----
Left Grip - Pounds	120	49.84	10.9	43	46.67	11.89	3.17	1.53	----

Table 4
Boys: Age 12
Group 1 - Normal   Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	104	149.77	3.72	45	148.07	3.01	1.70	2.93	.01
Weight - Pounds	96	101.69	24.25	34	90.50	23.17	11.19	2.30	.02
Height - Inches	96	61.88	3.55	34	59.35	3.26	2.53	3.78	.001
Throw for Distance - Feet	95	116.96	22.49	45	85.38	26.17	31.58	6.97	.001
Punt for Distance - Feet	95	70.43	17.67	45	42.71	16.54	27.72	9.06	.001
40 Yard Dash - Seconds	90	6.99	.77	45	7.65	.75	.66	4.71	.001
Standing Broad Jump - Inches	104	62.99	9.23	45	52.73	10.38	10.26	5.72	.001
Side Stepping - Score	104	10.13	1.99	45	7.80	1.74	2.33	7.07	.001
Accuracy Throw - Hits	103	15.20	4.32	45	13.80	4.58	1.40	1.74	----
Right Grip - Pounds	140	62.43	14.57	44	47.45	11.55	14.98	7.02	.001
Left Grip - Pounds	140	58.64	13.81	45	47.27	11.52	11.37	5.47	.001

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 5
Boys: Age 13
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	266	161.43	3.95	56	161.55	3.56	- .12	.23	----
Weight - Pounds	258	111.35	20.26	40	101.35	19.50	10.00	3.01	.01
Height - Inches	258	63.69	3.19	40	61.33	2.35	2.36	5.62	.001
Throw for Distance - Feet	255	131.37	29.24	55	107.89	28.07	23.48	5.58	.001
Punt for Distance - Feet	252	74.08	19.28	54	57.07	21.64	17.01	5.34	.001
40-Yard Dash - Seconds	260	6.52	.83	56	7.01	.61	.49	5.07	.001
Standing Broad Jump - Inches	263	67.92	9.84	55	60.04	10.09	7.88	5.29	.001
Side Stepping - Score	261	10.87	2.29	55	7.78	4.32	3.09	5.15	.001
Accuracy Throw - Hits	259	15.74	4.70	55	14.40	4.81	1.34	1.88	----
Right Grip - Pounds	273	74.20	16.73	54	59.15	16.35	15.05	6.14	.001
Left Grip - Pounds	273	67.15	15.67	54	60.06	17.23	7.09	2.80	.01

Table 6
Boys: Age 14
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	281	173.70	3.54	75	173.75	3.55	- .05	.09	----
Weight - Pounds	276	122.47	22.07	58	112.41	22.61	10.06	3.09	.01
Height - Inches	276	65.89	3.16	58	64.41	3.82	1.48	2.74	.01
Throw for Distance - Feet	275	150.64	28.96	75	129.93	32.52	25.71	4.99	.001
Punt for Distance - Feet	237	81.38	19.05	75	69.76	21.39	11.62	4.19	.001
40-Yard Dash - Seconds	278	6.14	.61	74	6.75	.70	.61	6.84	.001
Standing Broad Jump - Inches	281	74.35	9.77	74	64.45	10.98	9.90	7.06	.001
Side Stepping - Score	278	11.66	2.26	74	8.80	1.82	2.86	9.40	.001
Accuracy Throw - Hits	272	17.92	4.62	75	15.25	5.27	2.67	3.97	.001
Right Grip - Pounds	225	88.73	22.10	74	75.76	23.01	12.97	4.24	.001
Left Grip - Pounds	225	80.56	20.12	75	75.47	22.17	15.09	1.76	----

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.
**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 7
Boys: Age 15
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	166	184.02	3.32	46	184.98	3.17	- .96	1.80	----
Weight - Pounds	166	130.26	21.72	35	118.54	20.03	11.72	3.10	.01
Height - Inches	166	67.36	3.10	35	65.40	3.41	1.96	3.13	.01
Throw for Distance - Feet	165	161.12	34.25	46	138.93	37.12	22.19	3.64	.001
Punt for Distance - Feet	131	86.30	20.9	45	71.11	23.80	15.19	3.81	.001
40-Yard Dash - Seconds	164	5.92	.52	46	6.69	.79	.77	6.18	.001
Standing Broad Jump - Inches	166	77.12	10.66	45	65.38	11.84	11.74	6.02	.001
Side Stepping - Score	166	11.84	2.31	45	8.93	1.50	2.91	9.11	.001
Accuracy Throw - Hits	160	17.95	5.11	45	16.36	4.72	1.59	1.96	.05
Right Grip - Pounds	107	101.25	19.90	45	81.04	20.69	20.21	5.55	.001
Left Grip - Pounds	107	91.81	18.39	45	81.11	20.91	10.70	2.98	.01

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.
**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 8
Girls: Ages 7-9
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	389	101.66	9.64	24	108.67	9.02	-7.01	3.69	.001
Weight - Pounds	340	61.91	12.63	13	56.46	12.01	5.44	1.60	----
Height - Inches	340	51.85	2.86	13	50.31	3.88	1.54	1.43	----
Throw for Distance - Feet	368	39.26	11.92	24	42.42	14.95	-3.16	1.01	----
Punt for Distance - Feet	377	21.54	12.30	22	13.73	7.02	7.81	4.79	.001
40-Yard Dash - Seconds	386	8.25	.79	24	9.24	1.31	.99	3.66	.001
Standing Broad Jump - Inches	370	45.19	8.66	24	44.92	6.63	.27	.19	----
Side Stepping - Score	386	8.43	1.64	24	6.54	1.02	1.89	8.20	.001
Accuracy Throw - Hits	385	12.09	5.34	24	12.04	4.91	.05	.05	----
Right Grip - Pounds	337	26.55	8.23	24	29.38	7.01	-2.82	1.88	----
Left Grip - Pounds	337	26.36	7.93	24	28.67	5.94	-2.31	1.79	----

Table 9
Girls: Age 10
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	106	124.28	3.67	26	125.69	3.04	-1.41	3.69	.001
Weight - Pounds	106	77.58	18.33	16	70.50	16.00	7.08	1.61	----
Height - Inches	106	55.54	2.96	16	55.19	3.45	.35	.38	----
Throw for Distance - Feet	106	48.93	11.83	26	48.04	16.96	.90	.26	----
Punt for Distance - Feet	106	30.59	14.20	25	21.08	12.18	9.51	3.40	.001
40-Yard Dash - Seconds	106	7.27	.69	26	8.55	.88	1.28	6.95	.001
Standing Broad Jump - Inches	106	51.33	8.69	26	45.69	8.74	5.64	2.95	.01
Side Stepping - Score	97	9.32	2.10	26	7.54	1.24	1.78	5.50	.001
Accuracy Throw - Hits	97	13.07	4.76	26	10.92	5.11	2.15	1.94	----
Right Grip - Pounds	102	36.85	9.41	26	34.46	9.94	2.39	1.11	----
Left Grip - Pounds	102	36.41	9.30	26	32.69	9.69	3.72	1.76	----

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 10
Girls: Age 11
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	109	137.94	3.46	39	137.44	3.63	.51	.76	----
Weight - Pounds	109	91.74	19.33	25	82.88	14.21	8.87	2.62	.01
Height - Inches	109	58.64	3.14	25	57.71	2.61	.93	1.55	----
Throw for Distance - Feet	107	57.23	14.23	39	48.18	12.97	9.05	3.64	.001
Punt for Distance - Feet	108	39.19	15.67	37	23.78	12.62	15.41	6.02	.001
40-Yard Dash - Seconds	107	7.25	.73	39	8.41	.83	1.16	7.72	.001
Standing Broad Jump - Inches	109	55.99	8.10	39	48.05	9.20	7.94	4.78	.001
Side Stepping - Score	78	9.88	2.02	38	7.34	1.21	2.54	8.45	.001
Accuracy Throw - Hits	102	12.50	5.86	39	10.92	4.80	1.58	1.64	----
Right Grip - Pounds	114	42.22	11.81	39	42.08	9.80	.14	.07	----
Left Grip - Pounds	114	42.22	11.54	39	41.21	8.37	1.02	.59	----

Table 11
Girls: Age 12
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	54	147.09	2.53	33	149.18	3.22	-2.09	3.18	.01
Weight - Pounds	54	92.76	17.79	28	91.18	20.18	1.58	.35	----
Height - Inches	54	60.25	3.17	28	59.61	3.68	.64	.78	----
Throw for Distance - Feet	54	62.87	19.75	33	55.52	15.53	7.36	1.93	----
Punt for Distance - Feet	52	39.12	18.20	32	27.41	13.36	11.71	3.38	.001
40-Yard Dash - Seconds	53	7.23	.74	32	8.11	.91	.88	4.61	.001
Standing Broad Jump - Inches	53	56.08	8.77	32	52.72	9.67	3.36	1.61	----
Side Stepping - Score	49	9.47	2.26	32	7.91	1.51	1.56	3.72	.001
Accuracy Throw - Hits	54	13.17	4.48	33	12.61	4.68	.56	.55	----
Right Grip - Pounds	174	53.09	13.89	33	47.55	11.60	5.54	2.43	.02
Left Grip - Pounds	174	50.91	11.69	33	46.15	9.90	4.76	2.45	.02

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 12
Girls: Age 13
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	190	163.13	2.80	28	161.82	3.62	- .28	.43	----
Weight - Pounds	190	106.96	16.78	22	98.86	11.33	8.10	2.99	.01
Height - Inches	190	62.96	2.58	22	61.23	2.27	1.74	3.35	.001
Throw for Distance - Feet	189	69.80	20.57	28	62.96	15.86	6.83	2.04	.05
Punt for Distance - Feet	188	48.37	18.52	27	32.19	15.37	16.19	4.98	.001
40-Yard Dash - Seconds	190	7.11	.79	28	8.21	1.06	1.09	5.26	.001
Standing Broad Jump - Inches	190	60.68	8.60	28	52.71	8.32	7.96	4.71	.001
Side Stepping - Score	190	10.42	2.02	28	7.54	1.55	2.88	8.73	.001
Accuracy Throw - Hits	184	14.11	4.47	28	13.07	4.49	1.40	1.15	----
Right Grip - Pounds	172	60.37	11.97	28	51.54	8.36	8.83	4.83	.001
Left Grip - Pounds	172	56.30	10.59	28	50.46	10.38	5.84	2.75	.01

Table 13
Girls: Age 14
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	S.D.$_1$	N_2	M_2	S.D.$_2$	D_{1-2}*	C.R.	P**
Age - Months	219	173.95	3.32	31	174.23	3.37	- .28	.43	----
Weight - Pounds	219	113.42	18.03	27	109.93	18.88	3.49	.91	----
Height - Inches	219	63.84	2.47	27	61.56	2.97	2.29	3.85	.001
Throw for Distance - Feet	218	80.32	20.84	31	63.21	16.56	17.11	5.20	.001
Punt for Distance - Feet	202	53.68	18.69	31	33.68	17.75	20.01	5.80	.001
40-Yard Dash - Seconds	217	6.95	.78	30	8.43	1.11	1.48	7.08	.001
Standing Broad Jump - Inches	218	61.52	9.15	31	51.45	11.66	10.07	4.60	.001
Side Stepping - Score	219	9.92	2.02	30	7.60	1.38	2.32	8.10	.001
Accuracy Throw - Hits	211	14.71	4.57	31	11.26	5.17	3.45	3.43	.001
Right Grip - Pounds	206	66.37	14.27	31	55.19	14.76	11.18	3.95	.001
Left Grip - Pounds	206	60.66	13.91	30	52.80	14.07	7.86	2.86	.01

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

GROUP COMPARISONS ON PHYSICAL TESTS

Table 14
Girls: Age 15
Group 1 - Normal Group 2 - Mentally Handicapped

	N_1	M_1	$S.D._1$	N_2	M_2	$S.D._2$	D_{1-2}*	C.R.	P**
Age - Months	145	184.01	3.06	27	185.30	3.47	-1.28	1.79	----
Weight - Pounds	145	114.96	15.25	23	114.52	17.48	.44	.11	----
Height - Inches	145	63.93	2.29	23	62.96	2.65	.97	1.65	----
Throw for Distance - Feet	145	81.88	21.28	27	64.07	16.90	17.81	4.81	.001
Punt for Distance - Feet	123	57.07	18.21	26	31.50	14.68	25.57	7.70	.001
40-Yard Dash - Seconds	145	7.09	.93	27	8.03	.97	.94	4.64	.001
Standing Broad Jump - Inches	144	61.85	7.86	27	54.41	8.67	7.44	4.16	.001
Side Stepping - Score	144	9.92	1.90	27	7.81	1.21	2.11	7.53	.001
Accuracy Throw - Hits	142	15.61	5.37	27	13.44	5.81	2.17	1.80	----
Right Grip - Pounds	102	64.35	13.89	27	61.96	13.13	2.39	.83	----
Left Grip - Pounds	102	59.01	11.88	27	60.67	12.46	-1.66	.62	----

*Negative values indicate that the difference of the means is in favor of the mentally handicapped.

**All "P" values are less than the level indicated.

Table 15

AVERAGE TOTAL "T" SCORE FOR EIGHT TEST ITEMS
Boys by Age

Age	7	8	9	10	11	12	13	14	15
T-Score									
71					1				
70									
69									
68		1							
67								1	
66									
65									
64									
63									
62									
61									
60									
59									
58									
57			1						
56	1	1					1	1	
55		1			1			1	1
54		1	1	1			3	1	
53			1	1	2			3	2
52		2		2		2	4	2	
51					1			2	
50				2	1	1	3	3	
49		1	3		2	1		2	3
48		1		1	2	3	1	1	3
47				2	2	2	4	4	2
46			2	1	3		4	5	4
45			1	4	1	2	4	1	2
44			1	1		4	4	3	2
43			3	1				7	3
42				3	2	3	3	5	1
41	1		1		3	2	2	3	3
40	1			2		3	5	2	2
39		1	1		2	6	2	6	2
38		1	1		5		2	3	2
37	1		1	2		1	2	2	
36			2	1	1	2	2	2	1
35		1	2		2	1	1	1	2
34				1	1	1	1	3	1
33			1	1	1	1			3
32					1	4	2	1	2
31				3		1	1	2	1
30					2	1	1	1	
29			1	1	1	1		2	
28								1	1
27				1		1	1		
26					1				1
25									
24					2				
23									
22						1			
21			2						
20					1				
19								1	
18									1
N	4	10	25	31	41	44	53	72	45
X̄	43.5	54.6	40.9	41.9	40.7	39.7	43.0	42.5	40.9

Table 16

AVERAGE TOTAL "T" SCORE FOR EIGHT TEST ITEMS
Girls by Age

Age	7	8	9	10	11	12	13	14	15
T-Score									
62				1					
61									
60						1			
59									
58									
57					1				
56		1	1						
55				1					1
54				1		1			
53					1	1			
52						2			
51			1	1	1			3	1
50	1			1	2	1			1
49				3	3	2	1		2
48			2	1		3	2	1	2
47			2	1		3	3	2	
46			2		5	2	2		3
45	1			1	5	2	2	1	3
44			1	2	2	2	2	4	2
43		1		2		1	3	3	2
42			1	1	1		2		1
41		1	2		2		1	3	1
40		3			4	3	2		
39			1		2	3	1	2	2
38				1	2	1	2		
37			1	1		1	1	3	2
36				2	2	3	1		
35				3	3				1
34				1			1		1
33				1				1	
32								1	
31								1	1
30								1	
29					1			1	
28								1	
27									
26							1		
N	2	6	14	25	37	32	27	28	26
$\bar{X}$	47.5	43.3	45.2	43.8	43.1	44.9	42.1	40.7	43.5

APPENDIX A

ADMINISTRATION OF TEST ITEMS

A TEST OF GROSS MOTOR ACHIEVEMENT OF CHILDREN
AGES TEN THROUGH FIFTEEN AND OF
AGES SEVEN THROUGH NINE

Purpose

The primary purpose of this test is to measure the proficiency of children in performing certain gross motor activities. It can also be used: 1) to determine whether students are making progress in the acquisition of certain motor skills; 2) in diagnosing strengths or weaknesses in the elements common to many team games; 3) in classifying students into groups for purposes of instruction.

Procedure in Test Administration

1. Have all facilities, equipment and record sheets necessary for conducting the test ready in advance of the testing period.

2. Instructions and demonstrations should be given to the students for each of the test items immediately preceding the administration of the item. It is essential that each student understand clearly what he is to do.

Supplementary Data

Please record on the data sheets the student's age in years and months, weight to the nearest pound and his height to the nearest inch.

TEST DIRECTIONS

Item I - Softball Throw for Distance (Tennis Ball for Children Ages 7 through 9)

Equipment needed: With groups of ten students, five regulation 12 inch softballs, in good condition, should be used. A one hundred foot measuring tape is also needed.

Description: This item will need to be administered out-of-doors. A clear space at least 200 feet long and approximately 50 feet wide is necessary for proper administration of the Item. A restraining line must be clearly marked at one end of the space and each contestant must remain behind this line when the throw is made.

Five pairs of throwers, each provided with a softball, are allowed to warm up their arms. They are then given the following instructions:

Each contestant will be given four throws. The first throw is a practice throw and will not be measured. A contestant may run up to the restraining line in making the throw but he is not to cross it. (The instructor should demonstrate the skill for the group and repeat the demonstration for each group of throwers if such a demonstration seems necessary.) The distance from the restraining line to the spot where the ball first hits the ground, for the longest throw, shall be measured to the nearest foot. This distance is then recorded. Students may be used to retrieve the balls.

Item II - Soccer Ball Punt for Distance (Volleyball for Children Ages 7 through 9)

Equipment needed: With groups of ten students, five regulation soccer balls in good condition should be used. This Item will need to be administered out-of-doors. A one hundred foot measuring tape is also needed.

Description: The soccer ball is held in the contestant's hands. He stands behind the restraining line, takes several steps and punts the ball as far as he can, being sure that he doesn't step over the restraining line until after the ball has been kicked. (This Item should be demonstrated for each group.) The receivers should let the ball bounce before catching it. They then return the ball to the kicker.

Four punts are permitted. The first punt is a practice one and is not measured. The next three count and the longest one is measured to the nearest foot from the restraining line to the spot where the ball first hits the ground. This distance is recorded.

Item III - Forty Yard Run

Equipment needed: A stop watch. If two stop watches are available contestants may run two at a time.

Description: A smooth surface at least 60 yards in length and a starting line clearly marked as well as a finish line, forty yards from the starting line, are needed.

A standing start should be used with the commands, "Ready," "Go." With the word "go" the starter brings his arm down sharply, the contestant starts his run and the timer starts the watch. The timer is stationed at the finish line and when the contestant crosses this line the timer stops the watch. The time is recorded in seconds and tenths of seconds.

Only one trial should be allowed unless some unforeseen circumstance arises which in the opinion of the instructor should warrant another trial.

Item IV - Standing Broad Jump

Equipment needed: If given indoors the test requires a tumbling mat at least 9 feet long. A take-off line should be marked on the mat 18 inches from the end of the mat. This line could be a piece of adhesive tape. A measuring tape should have one end attached to this tape at the edge of the mat.

If the test is given out-of-doors, it is necessary to have a flat surface area approximately 6 feet by 10 feet. A take-off line should be clearly marked on the ground. A measuring tape is necessary for measuring each jump. The tape may be anchored to the take-off line.

Description: The performer stands behind the take-off line with toes on the line but not over it. The take-off is with both feet simultaneously and the jump is as far forward as possible. The distance is from the take-off line to the nearest heel (or to the nearest point to the take-off line at which any part of the body touches the ground, if body balance is lost). Three jumps are permitted and the longest jump is measured to the nearest inch. If the contestant steps over the take-off line in executing the jump, it is a foul and the jump is not counted but a trial is lost.

Item V - Side Stepping

Equipment needed: Three parallel lines four feet apart are drawn with chalk on the floor if the Item is administered indoors. If administered out-of-doors the lines are drawn on a cement surface. A stop watch is also necessary.

Description: The student stands astride the middle line. He side steps to the right until his right foot has touched or crossed the line to his right. He then side steps to the left until his left foot has touched or crossed the fartherest line to his left. These movements are repeated right to left and left to right as rapidly as possible for 15 seconds. Each trip from the center line to an outside line and back to the center line counts 1 point. This Item must be carefully demonstrated in order that the children understand clearly what is required. In executing the Item the student must have his shoulders perpendicular to the lines. He may not turn his body and approach the lines face on.

The score is the number of times the student crosses the middle line in 15 seconds.

Item VI - Tennis Ball Throw for Accuracy

Equipment needed: A waste paper basket 13 1/2 inches in diameter across the top and 14 inches deep, six tennis balls and a measuring tape are needed.

Description: Parallel lines are drawn four feet, eight feet and twelve feet (four feet, six feet and eight feet for children ages 7 through 9) from the waste paper basket. The performer has a practice throw at the four foot distance and then five throws that count. This procedure is followed at the eight foot and twelve foot lines. The number of balls thrown in the basket from each of the distances is recorded as the student's score. A towel should be placed in the basket to prevent balls from bouncing out.

If the contestant steps over the line in throwing the ball the throw shall not count. However, he should have another trial. An underhand throw is suggested. A ball which bounces off a backboard into the basket shall not count. A ball which goes into the basket and then bounces out should be counted.

Item VII - Grip Strength

Equipment needed: A grip dynamometer and a towel are needed.

Description: The edge of the dynamometer which is curved upward is placed against the fingers and the more rounded edge against the base of the hand. The curved edge of the dynamometer is placed between the first and second joints of the fingers. The indicator is face upward on the palm of the hand. The contestant may assume any position he wishes with the arm or body, so long as the hand or fingers are not permitted to rest against the body or any other object. The score is recorded on the indicator and estimated to the nearest pound.

The grip strength of the right hand and the left hand are each taken and recorded. It is necessary for the person giving the test to reset the hands of the indicator after each trial. This is done by taking one's fingers and gently forcing the hands of the indicator back to zero.

GROSS MOTOR SKILLS OF CHILDREN AGES TEN THROUGH FIFTEEN

SCHOOL ____________________

	NAME	AGE (years and months)	HEIGHT (nearest inch)	WEIGHT (nearest pound)	SOFTBALL THROW (nearest foot)	SOCCER BALL PUNT (nearest foot)	40 YARD RUN (seconds and tenths)	STANDING BROAD JUMP (nearest inch)	SIDE STEPPING (score in 15 seconds)	TENNIS BALL THROW FOR ACCURACY				GRIP STRENGTH (nearest pound)		BALANCE
										4'	8'	12'	SCORE	RIGHT	LEFT	
Ex.	John Smith	12-6	60	120	130	120	10. 2	72	20	1	1	1		20	30	
1.																
2.																
3.																
4.																
5.																
6.																
7.																
8.																
9.																
10.																
11.																
12.																
13.																

APPENDIX B
MOTOR ACHIEVEMENT "T" SCALES

A scale with a standard deviation of ten was used in these tables with -5 standard deviations having a scale value of 0 and ≠5 standard deviations having a scale value of 100. The mean score has a value of 50. The tables were derived from the actual data. In view of the varying sample sizes achievement scores beyond 3 standard deviations should be accepted with caution.

Schools Cooperating in Testing Normal Children

Albemarle City Schools, Albemarle, North Carolina
Hillcrest Elementary School, Burlington, North Carolina
Winecoff School, Cabarrus County, North Carolina
Cary High School, Cary, North Carolina
Charlotte City Schools, Charlotte, North Carolina
Chapel Hill City Schools, Chapel Hill, North Carolina
Clinton High School, Clinton, North Carolina
Carr Junior High School, Durham, North Carolina
East Durham Junior High School, Durham, North Carolina
Fayetteville City Schools, Fayetteville, North Carolina
Central Junior High School, Greensboro, North Carolina
Gillespie Park Junior High School, Greensboro, North Carolina
High Point Junior High School, High Point, North Carolina
Royal Oakes Schools, Kannapolis, North Carolina
Liberty City Schools, Liberty, North Carolina
Lumberton High School, Lumberton, North Carolina
Pittsboro City Schools, Pittsboro, North Carolina
Raleigh High School, Raleigh, North Carolina
Salisbury City Schools, Salisbury, North Carolina
Siler City Schools, Siler City, North Carolina
Millbrook High School, Wake County, North Carolina
Wilmington High School, Wilmington, North Carolina

Acknowledgment

The cooperation of the preceding North Carolina school systems in the collection of data for normal children is gratefully acknowledged by the author.

Table 1
T-Scores for
BALL THROW FOR DISTANCE*
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	132	176	182	152	122	95	255	275	161	
T-Score	Distance in Feet									T-Score
100	145	171	184	179	205	229	278	295	332	100
99	144	169	182	178	203	227	275	293	329	99
98	142	167	181	176	201	225	272	290	326	98
97	140	165	179	174	199	223	269	287	322	97
96	138	163	177	172	197	220	266	284	319	96
95	137	161	175	170	195	218	263	281	315	95
94	135	159	173	169	193	216	260	278	312	94
93	133	157	171	167	191	214	257	275	308	93
92	132	155	169	165	188	211	254	272	305	92
91	130	153	167	163	186	209	251	269	302	91
90	128	152	165	161	184	207	248	266	298	90
89	126	150	163	160	182	205	245	264	295	89
88	125	148	161	158	180	202	242	261	291	88
87	123	146	159	156	178	200	240	258	288	87
86	121	144	157	154	176	198	237	255	284	86
85	120	142	155	152	174	196	234	252	281	85
84	118	140	153	151	171	193	231	249	278	84
83	116	138	151	149	169	191	228	246	274	83
82	114	136	149	147	167	189	225	243	271	82
81	113	134	148	145	165	187	222	240	267	81
80	111	133	146	144	163	184	219	238	264	80
79	109	131	144	142	161	182	216	235	260	79
78	108	129	142	140	159	180	213	232	257	78
77	106	127	140	138	157	178	210	229	254	77
76	104	125	138	136	154	175	207	226	250	76
75	102	123	136	135	152	173	204	223	247	75
74	101	121	134	133	150	171	202	220	243	74
73	99	119	132	131	148	169	199	217	240	73
72	97	117	130	129	146	166	196	214	236	72
71	96	115	128	127	144	164	193	211	233	71
70	94	114	126	126	142	162	190	209	230	70
69	92	112	124	124	140	160	187	206	226	69
68	90	110	122	122	138	157	184	203	223	68
67	89	108	120	120	135	155	181	200	219	67
66	87	106	118	119	133	153	178	197	216	66
65	85	104	117	117	131	151	175	194	212	65
64	84	102	115	115	129	148	172	191	209	64
63	82	100	113	113	127	146	169	188	206	63
62	80	98	111	111	125	144	166	185	202	62
61	78	96	109	110	123	142	164	182	199	61
60	77	95	107	108	121	139	161	180	195	60
59	75	93	105	106	118	137	158	177	192	59
58	73	91	103	104	116	135	155	174	189	58
57	72	89	101	102	114	133	152	171	185	57
56	70	87	99	101	112	130	149	168	182	56
55	68	85	97	99	110	128	146	165	178	55
54	66	83	95	97	108	126	143	162	175	54
53	65	81	93	95	106	124	140	159	171	53
52	63	79	91	94	104	121	137	156	168	52
51	61	77	89	92	101	119	134	154	165	51

*For ages 7 through 9 - tennis ball; for ages 10 through 15 - softball.

Table 1
T-Scores for
BALL THROW FOR DISTANCE (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	132	176	182	152	122	95	255	275	161	
T-Score	Distance in Feet									T-Score
50	60	76	87	90	99	117	131	151	161	50
49	58	74	85	88	97	115	128	148	158	49
48	56	72	84	86	95	112	126	145	154	48
47	54	70	82	85	93	110	123	142	151	47
46	53	68	80	83	91	108	120	139	147	46
45	51	66	78	81	89	106	117	136	144	45
44	49	64	76	79	87	103	114	133	141	44
43	48	62	74	77	85	101	111	130	137	43
42	46	60	72	76	82	99	108	127	134	42
41	44	58	70	74	80	97	105	125	130	41
40	42	57	68	72	78	94	102	122	127	40
39	41	55	66	70	76	92	99	119	123	39
38	39	53	64	69	74	90	96	116	120	38
37	37	51	62	67	72	88	93	113	117	37
36	36	49	60	65	70	85	90	110	113	36
35	34	47	58	63	68	83	88	107	110	35
34	32	45	56	61	65	81	85	104	106	34
33	30	43	54	60	63	79	82	101	103	33
32	29	41	52	58	61	76	79	99	99	32
31	27	39	51	56	59	74	76	96	96	31
30	25	38	49	54	57	72	73	93	93	30
29	24	36	47	52	55	70	70	90	89	29
28	22	34	45	51	53	67	67	87	86	28
27	20	32	43	49	51	65	64	84	82	27
26	18	30	41	47	48	63	61	81	79	26
25	17	28	39	45	46	61	58	78	76	25
24	15	26	37	43	44	58	55	75	72	24
23	13	24	35	42	42	56	52	72	68	23
22	12	22	33	40	40	54	49	70	65	22
21	10	20	31	38	38	52	47	67	62	21
20	8	19	29	36	36	49	44	64	58	20
19	6	17	27	35	34	47	41	61	55	19
18	5	15	25	33	31	45	38	58	52	18
17	3	13	23	31	29	43	35	55	48	17
16	1	11	21	29	27	40	32	52	45	16
15		9	20	27	25	38	29	49	41	15
14		7	18	26	23	36	26	46	38	14
13		5	16	24	21	34	23	43	34	13
12		3	14	22	19	32	20	41	31	12
11		1	12	20	17	29	17	38	28	11
10			10	18	15	27	14	35	24	10
9				17	12	25	11	32	21	9
8				15	10	23	9	29	17	8
7				13		20	6	26	14	7
6				11		18	3	23	10	6
5				10		16		20	7	5
4						14		17	4	4
3						11		15		3
2						9		12		2
1						7		9		1

Table 2
T-Scores for
PUNT FOR DISTANCE*
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	132	178	189	153	122	95	252	259	131	
T-Score	Distance in Feet									T-Score
100	89	119	128	128	145	159	170	177	191	100
99	87	117	127	127	143	157	169	175	189	99
98	86	115	125	125	141	155	167	173	187	98
97	85	114	123	124	140	153	165	171	185	97
96	84	112	122	122	138	152	163	169	182	96
95	83	111	120	121	136	150	161	167	180	95
94	81	109	119	119	135	148	159	165	178	94
93	80	108	117	117	133	146	157	163	176	93
92	79	106	115	116	131	145	155	161	174	92
91	78	104	114	114	130	143	153	159	172	91
90	76	103	112	113	128	141	151	158	170	90
89	75	101	111	111	126	139	149	156	168	89
88	74	100	109	110	125	138	147	154	166	88
87	73	98	107	108	123	136	145	152	164	87
86	72	97	106	107	121	134	143	150	162	86
85	70	95	104	105	120	132	142	148	159	85
84	69	93	103	104	118	131	140	146	157	84
83	68	92	101	102	116	129	138	144	155	83
82	67	90	99	100	115	127	136	142	153	82
81	66	89	98	99	113	125	134	140	151	81
80	64	87	96	97	111	123	132	139	149	80
79	63	86	94	96	110	122	130	137	147	79
78	62	84	93	94	108	120	128	135	145	78
77	61	82	91	93	106	118	126	133	143	77
76	59	81	90	91	105	116	124	131	141	76
75	58	79	88	90	103	115	122	129	139	75
74	57	78	86	88	101	113	120	127	136	74
73	56	76	85	86	100	111	118	125	134	73
72	55	75	83	85	98	109	116	123	132	72
71	53	73	82	83	96	108	115	121	130	71
70	52	71	80	82	95	106	113	119	128	70
69	51	70	78	80	93	104	111	118	126	69
68	50	68	77	79	91	102	109	116	124	68
67	49	67	75	77	90	100	107	114	122	67
66	47	65	74	76	88	99	105	112	120	66
65	46	64	72	74	87	97	103	110	118	65
64	45	62	70	73	85	95	101	108	116	64
63	44	60	69	71	83	93	99	106	113	63
62	42	59	67	69	82	92	97	104	111	62
61	41	57	65	68	80	90	95	102	109	61
60	40	56	64	66	78	88	93	100	107	60
59	39	54	62	65	77	86	91	99	105	59
58	38	53	61	63	75	85	89	97	103	58
57	36	51	59	62	73	83	88	95	101	57
56	35	49	57	60	72	81	86	93	99	56
55	34	48	56	59	70	79	84	91	97	55
54	33	46	54	57	68	78	82	89	95	54
53	31	45	53	56	67	76	80	87	93	53
52	30	43	51	54	65	74	78	85	90	52
51	29	42	49	52	63	72	76	83	88	51

*For ages 7 through 9 - volley ball; for ages 10 through 15 - soccer ball.

Table 2
T-Scores for
PUNT FOR DISTANCE (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	132	178	189	153	122	95	252	259	131	
T-Score	Distance in Feet									T-Score
50	28	40	48	51	62	70	74	81	86	50
49	27	38	46	49	60	69	72	79	84	49
48	25	37	45	48	58	67	70	78	82	48
47	24	35	43	46	57	65	68	76	80	47
46	23	34	41	45	55	63	66	74	78	46
45	22	32	40	43	53	62	64	72	76	45
44	21	31	38	42	52	60	63	70	74	44
43	19	29	36	40	50	58	61	68	72	43
42	18	27	35	38	48	56	59	66	70	42
41	17	26	33	37	47	55	57	64	67	41
40	16	24	32	35	45	53	55	62	65	40
39	14	23	30	34	43	51	53	60	63	39
38	13	21	28	32	42	49	51	59	61	38
37	12	20	27	31	40	47	49	57	59	37
36	11	18	25	29	38	46	47	55	57	36
35	10	16	24	28	37	44	45	53	55	35
34	8	15	22	26	35	42	43	51	53	34
33	7	13	20	25	33	40	41	49	51	33
32	6	12	19	23	32	39	39	47	49	32
31	5	10	17	21	30	37	37	45	47	31
30	3	9	16	20	28	35	36	43	44	30
29	2	7	14	18	27	33	34	41	42	29
28	1	5	12	17	25	32	32	39	40	28
27		4	11	15	23	30	30	38	38	27
26		2	9	14	22	28	28	36	36	26
25		1	7	12	20	26	26	34	34	25
24			6	11	18	24	24	32	32	24
23			4	9	17	23	22	30	30	23
22			3	8	15	21	20	28	28	22
21			1	6	13	19	18	26	26	21
20				4	12	17	16	24	24	20
19				3	10	16	14	22	22	19
18				1	8	14	12	20	19	18
17					7	12	10	19	17	17
16					5	10	9	17	15	16
15					3	9	7	15	13	15
14					2	7	5	13	11	14
13						5	3	11	9	13
12						3	1	9	7	12
11						2		7	5	11
10								5	3	10
9								3	1	9
8								1		8
7										7
6										6
5										5
4										4
3										3
2										2
1										1

Table 3
T-Scores for
FORTY YARD DASH
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	130	182	192	141	102	90	260	278	164	
T-Score	Time in Seconds									T-Score
100	4.7	4.4	4.4			3.1	2.3	3.1	3.3	100
99	4.8	4.5	4.5	4.3	4.0	3.2	2.4			99
98	4.9					3.3	2.5	3.2	3.4	98
97		4.6	4.6	4.4	4.1		2.6	3.3		97
96	5.0	4.7	4.7			3.4	2.7		3.5	96
95	5.1			4.5	4.2	3.5	2.8	3.4		95
94		4.8	4.8	4.6	4.3	3.6			3.6	94
93	5.2	4.9	4.9			3.7	2.9	3.5		93
92	5.3			4.7	4.4		3.0	3.6	3.7	92
91	5.4	5.0	5.0			3.8	3.1		3.8	91
90		5.1		4.8	4.5	3.9	3.2	3.7		90
89	5.5	5.2	5.1		4.6	4.0	3.3	3.8	3.9	89
88	5.6		5.2	4.9						88
87		5.3		5.0	4.7	4.1	3.4	3.9	4.0	87
86	5.7	5.4	5.3			4.2	3.5			86
85	5.8		5.4	5.1	4.8	4.3	3.6	4.0	4.1	85
84		5.5			4.9		3.7			84
83	5.9	5.6	5.5	5.2		4.4	3.8	4.1	4.2	83
82	6.0		5.6		5.0	4.5		4.2		82
81		5.7		5.3	5.1	4.6	3.9		4.3	81
80	6.1	5.8	5.7	5.4		4.7	4.0	4.3		80
79	6.2	5.9	5.8		5.2		4.1	4.4	4.4	79
78	6.3			5.5		4.8	4.2			78
77		6.0	5.9		5.3	4.9	4.3	4.5	4.5	77
76	6.4	6.1		5.6	5.4	5.0				76
75	6.5		6.0				4.4	4.6	4.6	75
74		6.2	6.1	5.7	5.5	5.1	4.5	4.7		74
73	6.6	6.3		5.8		5.2	4.6		4.7	73
72	6.7		6.2		5.6	5.3	4.7	4.8		72
71		6.4	6.3	5.9	5.7	5.4	4.8		4.8	71
70	6.8	6.5						4.9	4.9	70
69	6.9		6.4	6.0	5.8	5.5	4.9	5.0		69
68	7.0	6.6	6.5			5.6	5.0		5.0	68
67		6.7		6.1	5.9	5.7	5.1	5.1		67
66	7.1	6.8	6.6	6.2	6.0		5.2		5.1	66
65	7.2		6.7			5.8	5.3	5.2		65
64		6.9		6.3	6.1	5.9		5.3	5.2	64
63	7.3	7.0	6.8			6.0	5.4			63
62	7.4		6.9	6.4	6.2	6.1	5.5	5.4	5.3	62
61		7.1			6.3		5.6			61
60	7.5	7.2	7.0	6.5		6.2	5.7	5.5	5.4	60
59	7.6			6.6	6.4	6.3	5.8	5.6		59
58		7.3	7.1			6.4			5.5	58
57	7.7	7.4	7.2	6.7	6.5		5.9	5.7		57
56	7.8				6.6	6.5	6.0	5.8	5.6	56
55	7.9	7.5	7.3	6.8		6.6	6.1			55
54		7.6	7.4		6.7	6.7	6.2	5.9	5.7	54
53	8.0	7.7		6.9	6.8		6.3	6.0		53
52	8.1		7.5	7.0		6.8			5.8	52
51		7.8	7.6		6.9	6.9	6.4	6.1	5.9	51

Table 3
T-Scores for
FORTY YARD DASH (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	130	182	192	141	102	90	260	278	164	
T-Score	Time in Seconds									T-Score
50	8.2	7.9		7.1		7.0	6.5			50
49	8.3		7.7		7.0	7.1	6.6	6.2	6.0	49
48		8.0	7.8	7.2	7.1		6.7			48
47	8.4	8.1				7.2	6.8	6.3	6.1	47
46	8.5		7.9	7.3	7.2	7.3		6.4		46
45		8.2	8.0	7.4		7.4	6.9		6.2	45
44	8.6	8.3			7.3		7.0	6.5		44
43	8.7	8.4	8.1	7.5	7.4	7.5	7.1		6.3	43
42	8.8		8.2			7.6	7.2	6.6		42
41		8.5		7.6	7.5	7.7	7.3	6.7	6.4	41
40	8.9	8.6	8.3							40
39	9.0		8.4	7.7	7.6	7.8	7.4	6.8	6.5	39
38	9.1	8.7			7.7	7.9	7.5	6.9		38
37	9.2	8.8	8.5	7.8		8.0	7.6		6.6	37
36				7.9	7.8	8.1	7.7	7.0		36
35	9.3	8.9	8.6				7.8	7.1	6.7	35
34	9.4	9.0	8.7	8.0	7.9	8.2				34
33	9.5				8.0	8.3	7.9	7.2	6.8	33
32		9.1	8.8	8.1		8.4	8.0	7.3		32
31	9.6	9.2	8.9		8.1		8.1		6.9	31
30	9.7	9.3		8.2	8.2	8.5	8.2	7.4	7.0	30
29			9.0	8.3		8.6	8.3	7.5		29
28	9.8	9.4	9.1		8.3	8.7			7.1	28
27	9.9	9.5		8.4		8.8	8.4	7.6		27
26			9.2		8.4		8.5		7.2	26
25	10.0	9.6	9.3	8.5	8.5	8.9	8.6	7.7		25
24	10.1	9.7				9.0	8.7	7.8	7.3	24
23	10.2		9.4	8.6	8.6	9.1	8.8			23
22		9.8	9.5	8.7				7.9	7.4	22
21	10.3	9.9			8.7	9.2	8.9	8.0		21
20	10.4		9.6	8.8	8.8	9.3	9.0		7.5	20
19		10.0				9.4	9.1	8.1		19
18	10.5	10.1	9.7	8.9	8.9		9.2		7.6	18
17	10.6	10.2	9.8			9.5	9.3	8.2		17
16				9.0	9.0	9.6		8.3		16
15	10.7	10.3	9.9		9.1	9.7	9.4		7.7	15
14	10.8	10.4	10.0	9.1		9.8	9.5	8.4		14
13				9.2	9.2		9.6		7.8	13
12	10.9	10.5	10.1			9.9	9.7	8.5		12
11	11.0	10.6	10.2	9.3	9.3	10.0	9.8	8.6	7.9	11
10	11.1				9.4	10.1				10
9		10.7	10.3	9.4			9.9	8.7	8.0	9
8	11.2	10.8	10.4		9.5	10.2	10.0			8
7	11.3			9.5		10.3	10.1	8.8	8.1	7
6		10.9	10.5	9.6	9.6	10.4	10.2	8.9	8.2	6
5	11.4	11.0	10.6		9.7	10.5	10.3			5
4	11.5	11.1		9.7				9.0	8.3	4
3			10.7		9.8	10.6	10.4			3
2	11.6	11.2		9.8	9.9	10.7	10.5	9.1	8.4	2
1	11.7	11.3	10.8	9.9					8.5	1

Table 4
T-Scores for
STANDING BROAD JUMP
Boys--Ages 7-15

Age	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	
No. of Cases	**129**	**178**	**181**	**153**	**122**	**104**	**263**	**281**	**166**	
T-Score	**Distance in Inches**									**T-Score**
100	85		92	92	97	109	117	123	130	100
99	84	87	91	91	96	108	116	122	129	99
98		86	90			107	115	121	128	98
97	83	85		90	95	106	114	120	127	97
96	82		89	89	94	105	113	119	126	96
95	81	84	88		93		112	118	125	95
94		83	87	88		104	111	117	124	94
93	80	82	86	87	92	103	110	116	123	93
92	79			86	91	102	109	115	122	92
91	78	81	85			101	108	114	121	91
90		80	84	85	90	100	107	113	120	90
89	77		83	84	89	99	106	112	119	89
88	76	79			88	98	105		118	88
87	75	78	82	83		97	104	111	117	87
86		77	81	82	87	96	103	110	115	86
85	74		80		86	95	102	109	114	85
84	73	76		81	85	94	101	108	113	84
83	72	75	79	80		93	100	107	112	83
82		74	78	79	84		99	106	111	82
81	71		77		83	92	98	105	110	81
80	70	73	76	78	82	91	97	104	109	80
79	69	72		77		90	96	103	108	79
78	68	71	75		81	89	95	102	107	78
77			74	76	80	88	94	101	106	77
76	67	70	73	75		87		100	105	76
75	66	69		74	79	86	93	99	104	75
74	65		72		78	85	92	98	103	74
73		68	71	73	77	84	91	97	102	73
72	64	67	70	72		83	90	96	101	72
71	63	66			76	82	89	95	99	71
70	62		69	71	75	81	88	94	98	70
69		65	68	70	74		87	93	97	69
68	61	64	67	69		80	86	92	96	68
67	60	63	66		73	79	85	91	95	67
66	59			68	72	78	84	90	94	66
65		62	65	67	71	77	83	89	93	65
64	58	61	64			76	82	88	92	64
63	57		63	66	70	75	81	87	91	63
62	56	60		65	69	74	80	86	90	62
61	55	59	62	64		73	79	85	89	61
60		58	61		68	72	78	84	88	60
59	54		60	63	67	71	77	83	87	59
58	53	57	59	62	66	70	76	82	86	58
57	52	56				69	75	81	85	57
56		55	58	61	65		74	80	84	56
55	51		57	60	64	68	73	79	82	55
54	50	54	56	59	63	67	72	78	81	54
53	49	53				66	71	77	80	53
52		52	55	58	62	65	70	76	79	52
51	48		54	57	61	64	69	75	78	51

Table 4

T-Scores for
STANDING BROAD JUMP (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	129	178	181	153	122	104	263	281	166	
T-Score	Distance in Inches									T-Score
50	47	51	53		60	63	68	74	77	50
49	46	50		56		62	67	73	76	49
48	45		52	55	59	61	66	72	75	48
47		49	51	54	58	60	65	71	74	47
46	44	48	50		57	59	64	70	73	46
45	43	47	49	53		58	63	69	72	45
44	42			52	56	57	62		71	44
43		46	48		55		61	68	70	43
42	41	45	47	51	54	56	60	67	69	42
41	40	44	46	50		55	59	66	68	41
40	39				53	54	58	65	66	40
39		43	45	49	52	53	57	64	65	39
38	38	42	44	48		52	56	63	64	38
37	37	41	43	47	51	51	55	62	63	37
36	36				50	50	54	61	62	36
35		40	42	46	49	49	53	60	61	35
34	35	39	41	45		48	52	59	60	34
33	34		40		48	47	51	58	59	33
32	33	38		44	47	46	50	57	58	32
31		37	39	43	46	45	49	56	57	31
30	32	36	38	42			48	55	56	30
29	31		37		45	44	47	54	55	29
28	30	35	36	41	44	43	46	53	54	28
27	29	34		40	43	42	45	52	53	27
26		33	35			41	44	51	52	26
25	28		34	39	42	40	43	50	50	25
24	27	32	33	38	41	39	42	49	49	24
23	26	31		37	40	38	41	48	48	23
22			32			37	40	47	47	22
21	25	30	31	36	39	36	39	46	46	21
20	24	29	30	35	38	35	38	45	45	20
19	23	28	29			34	37	44	44	19
18				34	37		36	43	43	18
17	22	27	28	33	36	33	35	42	42	17
16	21	26	27		35	32	34	41	41	16
15	20	25	26	32		31	33	40	40	15
14				31	34	30		39	39	14
13	19	24	25	30	33	29	32	38	38	13
12	18	23	24		32	28	31	37	37	12
11	17	22	23	29		27	30	36	36	11
10	16			28	31	26	29	35	34	10
9		21	22	27	30	25	28	34	33	9
8	15	20	21		29	24	27	33	32	8
7	14	19	20	26		23	26	32	31	7
6	13			25	28	22	25	31	30	6
5		18	19		27	21	24	30	29	5
4	12	17	18	24	26		23	29	28	4
3	11		17	23		20	22	28	27	3
2	10	16	16	22	25	19	21	27	26	2
1		15	15		24	18	20	26	25	1

Table 5
T-Scores for
SIDE STEPPING
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	129	181	187	153	127	104	261	278	166	
T-Score	Number of Times Crossing Center Line									T-Score
100			18			20	22	23		100
99					21					99
98	14								23	98
97				20						97
96		16						22		96
95						19	21			95
94			17		20				22	94
93										93
92				19						92
91	13						20	21		91
90		15				18			21	90
89					19					89
88			16	18						88
87							19	20		87
86										86
85						17			20	85
84	12				18					84
83		14	15	17						83
82							18	19		82
81									19	81
80					17	16				80
79				16						79
78							17	18		78
77		13	14						18	77
76	11									76
75				15	16	15				75
74								17		74
73							16			73
72									17	72
71			13							71
70		12		14	15					70
69						14		16		69
68	10						15		16	68
67										67
66				13						66
65			12		14			15		65
64		11				13	14		15	64
63										63
62										62
61	9			12	13					61
60			11					14		60
59						12	13		14	59
58										58
57		10		11						57
56					12			13		56
55							12		13	55
54			10			11				54
53	8									53
52				10				12		52
51		9					11		12	51

Table 5
T-Scores for
SIDE STEPPING (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	129	181	187	153	127	104	261	278	166	
T-Score	Number of Times Corssing Center Line									T-Score
50										50
49						10				49
48			9	9						48
47					10			11		47
46	7						10		11	46
45										45
44		8				9				44
43			8	8	9			10		43
42							9		10	42
41										41
40										40
39				7		8				39
38	6		7		8		8	9	9	38
37		7								37
36										36
35				6						35
34						7		8		34
33					7		7		8	33
32			6							32
31	5	6								31
30				5						30
29						6	6	7	7	29
28					6					28
27										27
26			5	4						26
25								6	6	25
24	4	5			5	5	5			24
23										23
22										22
21			4	3				5		21
20							4		5	20
19					4	4				19
18		4								18
17				2						17
16	3						3	4	4	16
15			3							15
14					3	3				14
13										13
12				1				3	3	12
11		3					2			11
10										10
9	2		2			2				9
8					2					8
7							1	2	2	7
6										6
5		2								5
4			1		1	1				4
3								1	1	3
2										2
1	1	1								1

Table 6
T-Scores for
TENNIS BALL ACCURACY THROW*
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	129	178	190	153	122	103	259	272	160	
T-Score	Total Number of Successful Tosses									T-Score
100										100
99										99
98										98
97										97
96										96
95										95
94										94
93										93
92										92
91										91
90										90
89										89
88										88
87										87
86										86
85										85
84						30				84
83	30									83
82						29				82
81	29									81
80					30	28	30			80
79	28	30		30						79
78							29			78
77	27	29		29	29	27				77
76			30				28	30		76
75	26	28		28	28	26			30	75
74			29				27	29		74
73		27		27	27	25			29	73
72	25		28				26	28		72
71		26		26	26				28	71
70	24		27			24	25	27		70
69		25		25	25				27	69
68	23		26			23	24	26		68
67		24	25	24	24				26	67
66	22					22				66
65		23	24		23		23	25	25	65
64	21			23						64
63		22	23		22	21	22	24	24	63
62	20			22						62
61		21	22		21	20	21	23	23	61
60	19			21						60
59		20	21		20	19	20	22	22	59
58	18			20						58
57		19	20		19		19	21	21	57
56	17			19		18				56
55		18	19		18		18	20	20	55
54	16			18		17				54
53		17	18		17		17			53
52	15			17		16		19	19	52
51		16	17		16		16			51

*For ages 7 through 9 - distances 4 ft., 6 ft., 8 ft., for ages 10 through 15 - distances 4 ft., 8 ft., 12 ft.

Table 6
T-Scores for
TENNIS BALL ACCURACY THROW (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	129	178	190	153	122	103	259	272	160	
T-Score	Total Number of Successful Tosses									T-Score
50	14		16	16		15		18	18	50
49		15			15					49
48	13		15	15			15	17	17	48
47		14			14	14				47
46	12		14	14			14	16	16	46
45		13			13	13				45
44	11		13	13			13	15	15	44
43		12				12				43
42	10		12	12	12		12	14	14	42
41		11								41
40	9		11	11	11	11	11		13	40
39								13		39
38		10	10	10	10	10	10		12	38
37	8		9					12		37
36		9		9	9	9	9		11	36
35	7		8					11		35
34		8		8	8		8		10	34
33	6		7			8		10	9	33
32		7		7	7					32
31	5		6			7	7	9	8	31
30		6		6	6					30
29	4		5			6	6	8	7	29
28		5		5	5					28
27	3		4				5		6	27
26		4		4	4	5		7		26
25	2		3				4		5	25
24		3		3	3	4		6		24
23	1		2				3		4	23
22		2		2	2	3		5		22
21			1				2		3	21
20		1		1	1			4		20
19						2	1		2	19
18								3		18
17						1			1	17
16								2		16
15										15
14										14
13								1		13
12										12
11										11
10										10
9										9
8										8
7										7
6										6
5										5
4										4
3										3
2										2
1										1

Table 7
T-Scores for
GRIP STRENGTH--RIGHT HAND
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	142	119	115	102	120	140	273	225	107	
T-Score	Number of Pounds									T-Score
100	67	71	76	91	107	135	158	199	201	100
99	66	70	75	90	106	134	156	197	199	99
98		69	74		105	132	154	195	197	98
97	65	68		89	103	131	153	193	195	97
96	64		73	88	102	129	151	190	193	96
95	63	67	72	87	101	128	149	188	191	95
94	62	66	71	86	100	127	148	186	189	94
93		65		85	99	125	146	184	187	93
92	61	64	70	84	98	124	144	182	185	92
91	60		69	83	97	122	143	179	183	91
90	59	63	68	82	96	121	141	177	181	90
89	58	62		81	95	119	140	175	179	89
88		61	67	80	93	118	138	173	177	88
87	57	60	66	79	92	116	136	170	175	87
86	56		65	78	91	115	134	168	173	86
85	55	59		77	90	113	133	166	171	85
84	54	58	64	76	89	112	131	164	169	84
83		57	63	75	88	111	129	162	167	83
82	53		62	74	87	109	128	159	165	82
81	52	56			86	108	126	157	163	81
80	51	55	61	73	85	106	124	155	161	80
79		54	60	72	83	105	123	153	159	79
78	50	53	59	71	82	103	121	151	157	78
77	49			70	81	102	119	148	155	77
76	48	52	58	69	80	100	118	146	153	76
75	47	51	57	68	79	99	116	144	151	75
74		50	56	67	78	97	114	142	149	74
73	46			66	77	96	113	140	147	73
72	45	49	55	65	76	94	111	137	145	72
71	44	48	54	64	74	93	109	135	143	71
70	43	47	53	63	73	92	108	133	141	70
69		46		62	72	90	106	131	139	69
68	42		52	61	71	89	104	129	137	68
67	41	45	51	60	70	87	103	126	135	67
66	40	44	50	59	69	86	101	124	133	66
65	39	43	49	58	68	84	99	122	131	65
64		42		57	67	83	98	120	129	64
63	38		48		66	81	96	117	127	63
62	37	41	47	56	64	80	94	115	125	62
61	36	40	46	55	63	78	93	113	123	61
60		39		54	62	77	91	111	121	60
59	35		45	53	61	76	89	109	119	59
58	34	38	44	52	60	74	88	106	117	58
57	33	37	43	51	59	73	86	104	115	57
56	32	36		50	58	71	84	102	113	56
55		35	42	49	57	70	83	100	111	55
54	31		41	48	55	68	81	98	109	54
53	30	34	40	47	54	67	79	95	107	53
52	29	33		46	53	65	78	93	105	52
51	28	32	39	45	52	64	76	91	103	51

Table 7
T-Scores for
GRIP STRENGTH--RIGHT HAND (continued)
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	142	119	115	102	120	140	273	225	107	
T-Score	Number of Pounds									T-Score
50		31	38	44	51	62	74	89	101	50
49	27		37	43	50	61	73	87	99	49
48	26	30		42	49	60	71	84	97	48
47	25	29	36	41	48	58	69	82	95	47
46	24	28	35		47	57	68	80	93	46
45			34	40	45	55	66	78	91	45
44	23	27		39	44	54	64	75	89	44
43	22	26	33	38	43	52	62	73	87	43
42	21	25	32	37	42	51	61	71	85	42
41	20	24	31	36	41	49	59	69	83	41
40				35	40	48	57	67	81	40
39	19	23	30	34	39	46	56	64	79	39
38	18	22	29	33	38	45	54	62	77	38
37	17	21	28	32	37	43	52	60	75	37
36		20		31	35	42	51	58	73	36
35	16		27	30	34	41	49	56	71	35
34	15	19	26	29	33	39	47	53	69	34
33	14	18	25	28	32	38	46	51	67	33
32	13	17		27	31	36	44	49	65	32
31			24	26	30	35	42	47	63	31
30	12	16	23	25	29	33	41	45	61	30
29	11	15	22	24	28	32	39	42	59	29
28	10	14			26	30	37	40	57	28
27	9	13	21	23	25	29	36	38	55	27
26			20	22	24	27	34	36	53	26
25	8	12	19	21	23	26	32	33	52	25
24	7	11		20	22	25	31	31	50	24
23	6	10	18	19	21	23	29	29	48	23
22	5	9	17	18	20	22	27	27	46	22
21			16	17	19	20	26	25	44	21
20	4	8	15	16	18	19	24	22	42	20
19	3	7		15	16	17	22	20	40	19
18	2	6	14	14	15	16	21	18	38	18
17	1		13	13	14	14	19	16	36	17
16		5	12	12	13	13	17	14	34	16
15		4		11	12	11	16	11	32	15
14		3	11	10	11	10	14	9	30	14
13		2	10	9	10	9	12	7	28	13
12			9	8	9	7	11	5	26	12
11		1			7	6	9	3	24	11
10			8	7	6	4	7	1	22	10
9			7	6	5	3	6		20	9
8			6	5	4	1	4		18	8
7				4	3		2		16	7
6			5	3	2		1		14	6
5			4	2	1				12	5
4			3	1					10	4
3									8	3
2			2						6	2
1			1						4	1

Table 8
T-Scores for
GRIP STRENGTH--LEFT HAND
Boys--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	142	119	115	102	120	140	273	225	107	
T-Score	Number of Pounds									T-Score
100	64	71		86	104	128	146	181	184	100
99	63	70	75	85	103	126	144	179	182	99
98		69	74	84	102	125	142	177	180	98
97	62		73	83	101	124	141	175	178	97
96	61	68			100	122	139	173	176	96
95	60	67	72	82	99	121	138	171	175	95
94		66	71	81	98	119	136	169	173	94
93	59		70	80	97	118	135	167	171	93
92	58	65		79	96	117	133	165	169	92
91		64	69	78	95	115	131	163	167	91
90	57	63	68	77	94	114	130	161	165	90
89	56	62	67	76	92	113	128	159	164	89
88	55		66		91	111	127	157	162	88
87		61		75	90	110	125	155	160	87
86	54	60	65	74	89	108	124	153	158	86
85	53	59	64	73	88	107	122	151	156	85
84	52	58	63	72	87	106	120	149	154	84
83				71	86	104	119	147	153	83
82	51	57	62	70	85	103	117	145	151	82
81	50	56	61		84	101	116	143	149	81
80		55	60	69	83	100	114	141	147	80
79	49	54		68	82	99	113	139	145	79
78	48		59	67	80	97	111	137	143	78
77	47	53	58	66	79	96	109	135	141	77
76		52	57	65	78	95	108	133	140	76
75	46	51		64	77	93	106	131	138	75
74	45	50	56	63	76	92	105	129	136	74
73	44		55		75	90	103	127	134	73
72		49	54	62	74	89	102	125	132	72
71	43	48		61	73	88	100	123	130	71
70	42	47	53	60	72	86	98	121	129	70
69			52	59	71	85	97	119	127	69
68	41	46	51	58	70	83	95	117	125	68
67	40	45		57	68	82	94	115	123	67
66	39	44	50		67	81	92	113	121	66
65		43	49	56	66	79	91	111	119	65
64	38		48	55	65	78	89	109	118	64
63	37	42		54	64	77	88	107	116	63
62	36	41	47	53	63	75	86	105	114	62
61		40	46	52	62	74	84	103	112	61
60	35	39	45	51	61	72	83	101	110	60
59	34			50	60	71	81	99	108	59
58		38	44		59	70	80	97	107	58
57	33	37	43	49	58	68	78	95	105	57
56	32	36	42	48	56	67	77	93	103	56
55	31	35		47	55	66	75	91	101	55
54			41	46	54	64	73	89	99	54
53	30	34	40	45	53	63	72	87	97	53
52	29	33	39	44	52	61	70	85	95	52
51		32			51	60	69	83	94	51

Table 8
T-Scores for
GRIP STRENGTH--LEFT HAND (continued)
Boys--Ages 7-15

T-Score	Age	7	8	9	10	11	12	13	14	15	T-Score
	No. of Cases	142	119	115	102	120	140	273	225	107	
		Number of Pounds									
50		28	31	38	43	50	59	67	81	92	50
49		27		37	42	49	57	66	78	90	49
48		26	30	36	41	48	56	64	76	88	48
47			29		40	47	54	62	74	86	47
46		25	28	35	39	46	53	61	72	84	46
45		24	27	34	38	44	52	59	70	83	45
44		23		33	37	43	50	58	68	81	44
43			26			42	49	56	66	79	43
42		22	25	32	36	41	48	55	64	77	42
41		21	24	31	35	40	46	53	62	75	41
40			23	30	34	39	45	51	60	73	40
39		20			33	38	43	50	58	72	39
38		19	22	29	32	37	42	48	56	70	38
37		18	21	28	31	36	41	47	54	68	37
36			20	27		35	39	45	52	66	36
35		17			30	34	38	44	50	64	35
34		16	19	26	29	32	37	42	48	62	34
33		15	18	25	28	31	35	41	46	61	33
32			17	24	27	30	34	39	44	59	32
31		14	16	23	26	29	32	37	42	57	31
30		13			25	28	31	36	40	55	30
29			15	22	24	27	30	34	38	53	29
28		12	14	21		26	28	33	36	51	28
27		11	13	20	23	25	27	31	34	50	27
26		10	12		22	24	25	30	32	48	26
25				19	21	23	24	28	30	46	25
24		9	11	18	20	22	23	26	28	44	24
23		8	10	17	19	19	21	25	26	42	23
22		7	9		18	18	20	23	24	40	22
21			8	16		17	19	22	22	38	21
20		6		15	17	16	17	20	20	37	20
19		5	7	14	16	15	16	19	18	35	19
18			6		15	14	14	17	16	33	18
17		4	5	13	14	13	13	15	14	31	17
16		3		12	13	12	12	14	12	29	16
15		2	4	11	12	11	10	12	10	27	15
14		1	3			10	9	11	8	26	14
13			2	10	11	9	8	9	6	24	13
12			1	9	10	7	6	8	4	22	12
11				8	9	6	5	6	2	20	11
10					8	5	3	4		18	10
9				7	7	4	2	3		16	9
8				6	6	3	1	1		15	8
7				5	5	2				13	7
6						1				11	6
5				4	4					9	5
4				3	3					7	4
3				2	2					5	3
2					1					4	2
1				1						2	1

Table 9
T-Scores for
BALL THROW FOR DISTANCE*
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	106	146	116	106	107	54	189	218	145	
T-Score	Distance in Feet									**T-Score**
100	87	87	107	108	128	161	171	185	188	100
99	86	86	106	107	127	160	169	182	186	99
98	85	85	105	106	126	158	167	180	184	98
97	84	84	104	105	124	156	164	178	182	97
96	83	83	102	103	123	154	162	176	180	96
95	82	82	101	102	121	152	160	174	178	95
94	81	81	100	101	120	150	158	172	176	94
93	80	80	99	100	118	148	156	170	173	93
92	79	79	97	99	117	146	154	168	171	92
91	78	78	96	97	116	144	152	166	169	91
90	77	77	95	96	114	142	150	164	167	90
89	75	76	94	95	113	140	148	162	165	89
88	74	75	93	94	111	138	146	160	163	88
87	73	74	91	93	110	136	144	157	161	87
86	72	73	90	92	108	134	142	155	159	86
85	71	72	89	90	107	132	140	153	156	85
84	70	71	88	89	106	130	138	151	154	84
83	69	70	86	88	104	128	136	149	152	83
82	68	69	85	87	103	126	134	147	150	82
81	67	68	84	86	101	124	132	145	148	81
80	66	67	83	84	100	122	129	143	146	80
79	65		82	83	98	120	127	141	144	79
78	64	66	80	82	97	118	125	139	141	78
77	63	65	79	81	96	116	123	137	139	77
76	62	64	78	80	94	114	121	134	137	76
75	61	63	77	79	93	112	119	132	135	75
74	59	62	75	77	91	110	117	130	133	74
73	58	61	74	76	90	108	115	128	131	73
72	57	60	73	75	89	106	113	126	129	72
71	56	59	72	74	87	104	111	124	127	71
70	55	58	70	73	86	102	109	122	124	70
69	54	57	69	71	84	100	107	120	122	69
68	53	56	68	70	83	98	105	118	120	68
67	52	55	67	69	81	96	103	116	118	67
66	51	54	66	68	80	94	101	114	116	66
65	50	53	64	67	79	92	99	112	114	65
64	49	52	63	65	77	90	97	110	112	64
63	48	51	62	64	76	88	95	107	110	63
62	47	50	61	63	74	86	92	105	107	62
61	46	49	59	62	73	84	90	103	105	61
60	44	48	58	61	71	82	88	101	103	60
59	43	47	57	60	70	81	86	99	101	59
58	42	46	56	58	69	79	84	97	99	58
57	41	45	55	57	67	77	82	95	97	57
56	40	44	53	56	66	75	80	93	95	56
55	39	43	52	55	64	73	78	91	93	55
54	38	42	51	54	63	71	76	89	90	54
53	37	41	50	52	62	69	74	87	88	53
52	36	40	48	51	60	67	72	84	86	52
51	35	39	47	50	59	65	70	82	84	51

*For ages 7 through 9 - tennis ball; for ages 10 through 15 - softball.

Table 9
T-Scores for
BALL THROW FOR DISTANCE (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	106	146	116	106	107	54	189	218	145	
T-Score	Distance in Feet									T-Score
50	34	38	46	49	57	63	68	80	82	50
49	33	37	45	48	56	61	66	78	80	49
48	32	36	44	47	54	59	64	76	78	48
47	31	35	42	45	53	57	62	74	75	47
46	30	34	41	44	52	55	60	72	73	46
45	28	33	40	43	50	53	58	70	71	45
44	27	32	39	42	49	51	55	68	69	44
43	26	31	37	41	47	49	53	66	67	43
42	25	30	36	39	46	47	51	64	65	42
41	24	29	35	38	44	45	49	62	63	41
40	23	28	34	37	43	43	47	59	61	40
39	22	27	33	36	42	41	45	57	58	39
38	21	26	31	35	40	39	43	55	56	38
37	20	25	30	34	39	37	41	53	54	37
36	19	24	29	32	37	35	39	51	52	36
35	18	23	28	31	36	33	37	49	50	35
34	17	22	26	30	34	31	35	47	48	34
33	16	21	25	29	33	29	33	45	46	33
32	15	20	24	28	32	27	31	43	44	32
31	14	19	23	26	30	25	29	41	41	31
30	12	18	22	25	29	23	27	39	39	30
29	11	17	20	24	27	21	25	37	37	29
28	10	16	19	23	26	19	23	34	35	28
27	9	15	18	22	25	17	20	32	33	27
26	8	14	17	21	23	15	18	30	31	26
25	7	13	15	19	22	13	16	28	29	25
24	6	12	14	18	20	11	14	26	27	24
23	5	11	13	17	19	9	12	24	24	23
22	4	10	12	16	17	7	10	22	22	22
21	3	9	11	15	16	5	8	20	20	21
20	2	8	9	13	15	3	6	18	18	20
19	1	7	8	12	13	2	4	16	16	19
18		6	7	11	12	1	2	14	14	18
17		5	6	10	10		1	12	12	17
16		4	4	9	9			9	10	16
15		3	3	8	7			7	7	15
14		2	2	6	6			5	5	14
13		1	1	5	5			3	3	13
12				4	3			1	1	12
11				3	2					11
10				2	1					10
9				1						9
8										8
7										7
6										6
5										5
4										4
3										3
2										2
1										1

Table 10
T-Scores for
PUNT FOR DISTANCE*
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	102	152	123	106	108	52	187	202	123	
T-Score	Distance in Feet									T-Score
100	59	78	93	102	118	130	141	147	148	100
99	58	77	92	100	116	128	139	145	146	99
98	57	76	90	99	114	126	137	143	144	98
97	56	75	89	97	113	125	135	142	143	97
96	55	74	88	96	111	123	133	140	141	96
95		72	86	94	110	121	132	138	139	95
94	54	71	85	93	108	119	130	136	137	94
93	53	70	84	92	107	117	128	134	135	93
92	52	69	82	90	105	116	126	132	134	92
91	51	68	81	89	103	114	124	130	132	91
90	50	67	80	87	102	112	122	128	130	90
89	49	66	78	86	100	110	121	127	128	89
88	48	65	77	85	99	108	119	125	126	88
87		63	76	83	97	106	117	123	124	87
86	47	62	75	82	96	105	115	121	123	86
85	46	61	73	80	94	103	113	119	121	85
84	45	60	72	79	92	101	111	117	119	84
83	44	59	71	77	91	99	109	115	117	83
82	43	58	69	76	89	97	108	113	115	82
81	42	57	68	75	88	96	106	112	114	81
80	41	55	67	73	86	94	104	110	112	80
79		54	65	72	85	92	102	108	110	79
78	40	53	64	70	83	90	100	106	108	78
77	39	52	63	69	82	88	98	104	106	77
76	38	51	61	68	80	86	97	102	104	76
75	37	50	60	66	78	85	95	100	103	75
74	36	49	59	65	77	83	93	99	101	74
73	35	47	57	63	75	81	91	97	99	73
72	34	46	56	62	74	79	89	95	97	72
71	33	45	55	60	72	77	87	93	95	71
70		44	54	59	71	76	85	91	94	70
69	32	43	52	58	69	74	84	89	92	69
68	31	42	51	56	67	72	82	87	90	68
67	30	41	50	55	66	70	80	85	88	67
66	29	40	48	53	64	68	78	84	86	66
65	28	38	47	52	63	66	76	82	84	65
64	27	37	46	50	61	65	74	80	83	64
63	26	36	44	49	60	63	72	78	81	63
62		35	43	48	58	61	71	76	79	62
61	25	34	42	46	56	59	69	74	77	61
60	24	33	40	45	55	57	67	72	75	60
59	23	32	39	43	53	55	65	70	73	59
58	22	30	38	42	52	54	63	69	72	58
57	21	29	36	41	50	52	61	67	70	57
56	20	28	35	39	49	50	59	65	68	56
55	19	27	34	38	47	48	58	63	66	55
54	18	26	33	36	45	46	56	61	64	54
53		25	31	35	44	45	54	59	63	53
52	17	24	30	33	42	43	52	57	61	52
51	16	22	29	32	41	41	50	56	59	51

*For ages 7 through 9 - volley ball; for ages 10 through 15 - soccer ball.

Table 10
T-Scores for
PUNT FOR DISTANCE (continued)
Girls--Ages 7-15

T-Score	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13	Age 14	Age 15	T-Score
No. of Cases	102	152	123	106	108	52	187	202	123	
	Distance in Feet									
50	15	21	27	31	39	39	48	54	57	50
49	14	20	26	29	38	37	47	52	55	49
48	13	19	25	28	36	35	45	50	53	48
47	12	18	23	26	34	34	43	48	52	47
46	11	17	22	25	33	32	41	46	50	46
45		16	21	23	31	30	39	44	48	45
44	10	15	19	22	30	28	37	42	46	44
43	9	13	18	21	28	26	35	41	44	43
42	8	12	17	19	27	25	34	39	43	42
41	7	11	15	18	25	23	32	37	41	41
40	6	10	14	16	24	21	30	35	39	40
39	5	9	13	15	22	19	28	33	37	39
38	4	8	12	14	20	17	26	31	35	38
37		7	10	12	19	15	24	29	33	37
36	3	5	9	11	17	14	22	28	32	36
35	2	4	8	9	16	12	21	26	30	35
34	1	3	6	8	14	10	19	24	28	34
33		2	5	6	13	8	17	22	26	33
32		1	4	5	11	6	15	20	24	32
31			2	4	9	5	13	18	22	31
30			1	2	8	3	11	16	21	30
29				1	6	1	9	14	19	29
28					5		8	13	17	28
27					3		6	11	15	27
26					2		4	9	13	26
25					1		2	7	12	25
24							1	5	10	24
23								3	8	23
22								1	6	22
21									4	21
20									2	20
19									1	19
18										18
17										17
16										16
15										15
14										14
13										13
12										12
11										11
10										10
9										9
8										8
7										7
6										6
5										5
4										4
3										3
2										2
1										1

Table 11
T-Scores for
FORTY YARD DASH
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	105	155	126	106	107	53	190	217	145	
T-Score	Time in Seconds									T-Score
100	4.4		4.1	3.9	3.6	2.9	3.2	3.0	2.5	100
99	4.5	4.6	4.2			3.0		3.1		99
98	4.6	4.7	4.3	4.0	3.7	3.1	3.3	3.2	2.6	98
97		4.8		4.1	3.8	3.2	3.4		2.7	97
96	4.7		4.4			3.3	3.5	3.3	2.8	96
95	4.8	4.9	4.5	4.2	3.9	3.4	3.6	3.4	2.9	95
94	4.9	5.0	4.6	4.3	4.0			3.5	3.0	94
93	5.0	5.1		4.4	4.1	3.5	3.7	3.6	3.1	93
92			4.7			3.6	3.8		3.2	92
91	5.1	5.2	4.8	4.5	4.2	3.7	3.9	3.7	3.3	91
90	5.2	5.3	4.9	4.6	4.3	3.8		3.8	3.4	90
89	5.3	5.4	5.0		4.4	3.9	4.0	3.9	3.5	89
88	5.4			4.7		4.0	4.1		3.6	88
87	5.5	5.5	5.1	4.8	4.5		4.2	4.0	3.7	87
86		5.6	5.2		4.6	4.1	4.3	4.1	3.8	86
85	5.6	5.7	5.3	4.9	4.7	4.2		4.2		85
84	5.7			5.0		4.3	4.4	4.3	3.9	84
83	5.8	5.8	5.4		4.8	4.4	4.5		4.0	83
82	5.9	5.9	5.5	5.1	4.9	4.5	4.6	4.4	4.1	82
81			5.6	5.2		4.6	4.7	4.5	4.2	81
80	6.0	6.0	5.7		5.0			4.6	4.3	80
79	6.1	6.1		5.3	5.1	4.7	4.8	4.7	4.4	79
78	6.2	6.2	5.8	5.4	5.2	4.8	4.9		4.5	78
77	6.3		5.9	5.5		4.9	5.0	4.8	4.6	77
76	6.4	6.3	6.0		5.3	5.0		4.9	4.7	76
75		6.4	6.1	5.6	5.4	5.1	5.1	5.0	4.8	75
74	6.5	6.5		5.7	5.5	5.2	5.2		4.9	74
73	6.6		6.2				5.3	5.1	5.0	73
72	6.7	6.6	6.3	5.8	5.6	5.3	5.4	5.2		72
71	6.8	6.7	6.4	5.9	5.7	5.4		5.3	5.1	71
70		6.8			5.8	5.5	5.5	5.4	5.2	70
69	6.9		6.5	6.0		5.6	5.6		5.3	69
68	7.0	6.9	6.6	6.1	5.9	5.7	5.7	5.5	5.4	68
67	7.1	7.0	6.7		6.0	5.8	5.8	5.6	5.5	67
66	7.2	7.1	6.8	6.2				5.7	5.6	66
65	7.3			6.3	6.1	5.9	5.9	5.8	5.7	65
64		7.2	6.9		6.2	6.0	6.0		5.8	64
63	7.4	7.3	7.0	6.4	6.3	6.1	6.1	5.9	5.9	63
62	7.5	7.4	7.1	6.5		6.2	6.2	6.0	6.0	62
61	7.6			6.6	6.4	6.3		6.1	6.1	61
60	7.7	7.5	7.2		6.5	6.4	6.3		6.2	60
59		7.6	7.3	6.7	6.6		6.4	6.2		59
58	7.8		7.4	6.8		6.5	6.5	6.3	6.3	58
57	7.9	7.7	7.5		6.7	6.6		6.4	6.4	57
56	8.0	7.8		6.9	6.8	6.7	6.6	6.5	6.5	56
55	8.1	7.9	7.6		6.9	6.8	6.7		6.6	55
54			7.7	7.0		6.9	6.8	6.6	6.7	54
53	8.2	8.0	7.8		7.0	7.0	6.9	6.7	6.8	53
52	8.3	8.1		7.1	7.1			6.8	6.9	52
51	8.4	8.2	7.9	7.2		7.1	7.0	6.9	7.0	51

Table 11
T-Scores for
FORTY YARD DASH (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	105	155	126	106	107	93	190	217	145	
T-Score	Time in Seconds									T-Score
50	8.5		8.0		7.2	7.2	7.1		7.1	50
49	8.6	8.3	8.1	7.3	7.3	7.3	7.2	7.0	7.2	49
48		8.4	8.2	7.4	7.4	7.4	7.3	7.1	7.3	48
47	8.7	8.5				7.5		7.2	7.4	47
46	8.8		8.3	7.5	7.5		7.4		7.5	46
45	8.9	8.6	8.4	7.6	7.6	7.6	7.5	7.3		45
44	9.0	8.7	8.5		7.7	7.7	7.6	7.4	7.6	44
43		8.8	8.6	7.7		7.8		7.5	7.7	43
42	9.1			7.8	7.8	7.9	7.7	7.6	7.8	42
41	9.2	8.9	8.7	7.9	7.9	8.0	7.8		7.9	41
40	9.3	9.0	8.8			8.1	7.9	7.7	8.0	40
39	9.4		8.9	8.0	8.0		8.0	7.8	8.1	39
38	9.5	9.1		8.1	8.1	8.2		7.9	8.2	38
37		9.2	9.0		8.2	8.3	8.1		8.3	37
36	9.6	9.3	9.1	8.2		8.4	8.2	8.0	8.4	36
35	9.7		9.2	8.3	8.3	8.5	8.3	8.1	8.5	35
34	9.8	9.4	9.3		8.4	8.6	8.4	8.2	8.6	34
33	9.9	9.5		8.4	8.5	8.7		8.3	8.7	33
32		9.6	9.4	8.5			8.5			32
31	10.0		9.5		8.6	8.8	8.6	8.4	8.8	31
30	10.1	9.7	9.6	8.6	8.7	8.9	8.7	8.5	8.9	30
29	10.2	9.8		8.7	8.8	9.0	8.8	8.6	9.0	29
28	10.3	9.9	9.7			9.1		8.7	9.1	28
27	10.4		9.8	8.8	8.9	9.2	8.9		9.2	27
26		10.0	9.9	8.9	9.0	9.3	9.0	8.8	9.3	26
25	10.5	10.1	10.0	9.0	9.1	9.4	9.1	8.9	9.4	25
24	10.6	10.2						9.0	9.5	24
23	10.7		10.1	9.1	9.2	9.5	9.2		9.6	23
22	10.8	10.3	10.2	9.2	9.3	9.6	9.3	9.1	9.7	22
21		10.4	10.3			9.7	9.4	9.2	9.8	21
20	10.9	10.5	10.4	9.3	9.4	9.8	9.5	9.3	9.9	20
19	11.0			9.4	9.5	9.9		9.4		19
18	11.1	10.6	10.5		9.6	10.0	9.6		10.0	18
17	11.2	10.7	10.6	9.5			9.7	9.5	10.1	17
16	11.3		10.7	9.6	9.7	10.1	9.8	9.6	10.2	16
15		10.8			9.8	10.2	9.9	9.7	10.3	15
14	11.4	10.9	10.8	9.7	9.9	10.3		9.8	10.4	14
13	11.5	11.0	10.9	9.8		10.4	10.0		10.5	13
12	11.6		11.0		10.0	10.5	10.1	9.9	10.6	12
11	11.7	11.1	11.1	9.9	10.1	10.6	10.2	10.0	10.7	11
10		11.2		10.0	10.2			10.1	10.8	10
9	11.8	11.3	11.2			10.7	10.3		10.9	9
8	11.9		11.3	10.1	10.3	10.8	10.4	10.2	11.0	8
7	12.0	11.4	11.4	10.2	10.4	10.9	10.5	10.3	11.1	7
6	12.1	11.5		10.3		11.0	10.6	10.4	11.2	6
5		11.6	11.5		10.5	11.1		10.5		5
4	12.2		11.6	10.4	10.6	11.2	10.7		11.3	4
3	12.3	11.7	11.7	10.5	10.7		10.8	10.6	11.4	3
2	12.4	11.8	11.8			11.3	10.9	10.7	11.5	2
1	12.5	11.9	11.9	10.6	10.8	11.4	11.0	10.8	11.6	1

Table 12
T-Scores for
STANDING BROAD JUMP
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	107	148	115	106	109	53	190	218	144	
T-Score	Distance in Inches									T-Score
100	77	81	87	95		100	104	107	100	100
99	76	80	86	94	96	99	103	106		99
98	75		85	93	95	98	102	105	99	98
97		79		92	94	97	101		98	97
96	74	78	84	91	93	96	100	104	97	96
95	73	77	83				99	103		95
94			82	90	92	95		102	96	94
93	72	76	81	89	91	94	98	101	95	93
92	71	75		88	90	93	97	100	94	92
91			80	87	89	92	96	99	93	91
90	70	74	79	86	88	91	95	98		90
89	69	73	78	85		90	94	97	92	89
88	68			84	87	89	93	96	91	88
87		72	77		86			95	90	87
86	67	71	76	83	85	88	92	94		86
85	66	70	75	82	84	87	91		89	85
84			74	81		86	90	93	88	84
83	65	69		80	83	85	89	92	87	83
82	64	68	73	79	82	84	88	91		82
81			72	78	81	83	87	90	86	81
80	63	67	71	77	80	82		89	85	80
79	62	66					86	88	84	79
78	61		70	76	79	81	85	87	83	78
77		65	69	75	78	80	84	86		77
76	60	64	68	74	77	79	83	85	82	76
75	59	63	67	73	76	78	82	84	81	75
74				72		77	81	83	80	74
73	58	62	66	71	75	76	80			73
72	57	61	65		74	75		82	79	72
71			64	70	73		79	81	78	71
70	56	60		69	72	74	78	80	77	70
69	55	59	63	68	71	73	77	79		69
68			62	67		72	76	78	76	68
67	54	58	61	66	70	71	75	77	75	67
66	53	57	60	65	69	70	74	76	74	66
65	52	56		64	68	69		75	73	65
64			59		67	68	73	74		64
63	51	55	58	63			72	73	72	63
62	50	54	57	62	66	67	71		71	62
61				61	65	66	70	72	70	61
60	49	53	56	60	64	65	69	71		60
59	48	52	55	59	63	64	68	70	69	59
58			54	58		63		69	68	58
57	47	51	53	57	62	62	67	68	67	57
56	46	50			61	61	66	67		56
55		49	52	56	60		65	66	66	55
54	45		51	55	59	60	64	65	65	54
53	44	48	50	54		59	63	64	64	53
52	43	47		53	58	58	62	63		52
51			49	52	57	57		62	63	51

Table 12
T-Scores for
STANDING BROAD JUMP (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	107	148	115	106	109	53	190	218	144	
T-Score	Distance in Inches									T-Score
50	42	46	48	51	56	56	61		62	50
49	41	45	47	50	55	55	60	61	61	49
48			46		54	54	59	60	60	48
47	40	44		49		53	58	59		47
46	39	43	45	48	53		57	58	59	46
45			44	47	52	52	56	57	58	45
44	38	42	43	46	51	51		56	57	44
43	37	41	42	45	50	50	55	55		43
42		40		44		49	54	54	56	42
41	36		41		49	48	53	53	55	41
40	35	39	40	43	48	47	52	52	54	40
39	34	38	39	42	47	46	51	51		39
38				41	46		50		53	38
37	33	37	38	40		45		50	52	37
36	32	36	37	39	45	44	49	49	51	36
35			36	38	44	43	48	48	50	35
34	31	35		37	43	42	47	47		34
33	30	34	35		42	41	46	46	49	33
32		33	34	36	41	40	45	45	48	32
31	29		33	35		39	44	44	47	31
30	28	32	32	34	40			43		30
29	27	31		33	39	38	43	42	46	29
28			31	32	38	37	42	41	45	28
27	26	30	30	31	37	36	41	40	44	27
26	25	29	29	30		35	40			26
25			28		36	34	39	39	43	25
24	24	28		29	35	33	38	38	42	24
23	23	27	27	28	34	32		37	41	23
22			26	27	33		37	36	40	22
21	22	26	25	26		31	36	35		21
20	21	25		25	32	30	35	34	39	20
19	20	24	24	24	31	29	34	33	38	19
18			23		30	28	33	32	37	18
17	19	23	22	23	29	27	32	31		17
16	18	22		22		26	31	30	36	16
15			21	21	28	25			35	15
14	17	21	20	20	27		30	29	34	14
13	16	20	19	19	26	24	29	28	33	13
12			18	18	25	23	28	27		12
11	15	19		17	24	22	27	26	32	11
10	14	18	17			21	26	25	31	10
9		17	16	16	23	20	25	24	30	9
8	13		15	15	22	19		23		8
7	12	16	14	14	21	18	24	22	29	7
6		15		13	20		23	21	28	6
5	11		13	12		17	22	20	27	5
4	10	14	12	11	19	16	21	19		4
3		13	11		18	15	20		26	3
2	9			10	17	14		18	25	2
1	8	12	10	9	16	13	19	17	24	1

Table 13
T-Scores for
SIDE STEPPING
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	107	154	125	97	78	49	190	219	144	
T-Score	Number of Times Crossing Center Line									T-Score
100		16		20	20			20		100
99										99
98									19	98
97			17			20	20			97
96				19						96
95	14				19			19		95
94		15								94
93							19		18	93
92						19				92
91			16	18						91
90					18			18		90
89										89
88	13					18	18			88
87		14		17					17	87
86										86
85			15		17			17		85
84										84
83						17	17			83
82				16					16	82
81	12	13								81
80					16			16		80
79			14			16				79
78							16			78
77				15					15	77
76										76
75					15	15		15		75
74	11	12								74
73			13				15			73
72				14					14	72
71										71
70					14	14		14		70
69										69
68				13			14			68
67	10	11	12							67
66						13			13	66
65					13			13		65
64										64
63				12			13			63
62										62
61		10	11		12	12			12	61
60	9							12		60
59										59
58				11			12			58
57						11				57
56			10		11				11	56
55								11		55
54		9								54
53	8			10			11			53
52						10				52
51					10					51

Table 13
T-Scores for
SIDE STEPPING (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	107	154	125	97	78	49	190	219	144	
T-Score	Number of Times Crossing Center Line									T-Score
50			9					10	10	50
49				9						49
48						9	10			48
47		8								47
46	7				9			9		46
45									9	45
44			8	8		8				44
43							9			43
42										42
41					8			8		41
40		7							8	40
39	6			7		7				39
38			7				8			38
37										37
36					7			7		36
35						6			7	35
34		6		6						34
33							7			33
32	5		6							32
31					6			6		31
30				5		5				30
29									6	29
28							6			28
27		5								27
26			5		5	4		5		26
25	4			4						25
24									5	24
23							5			23
22										22
21					4	3		4		21
20		4	4	3						20
19									4	19
18	3						4			18
17						2				17
16					3			3		16
15				2						15
14		3	3						3	14
13							3			13
12						1				12
11	2				2			2		11
10				1						10
9										9
8			2				2		2	8
7		2								7
6					1			1		6
5										5
4	1									4
3							1		1	3
2			1							2
1		1								1

Table 14
T-Scores for
TENNIS BALL ACCURACY THROW*
Girls--Ages 7-15

	Total Number of Successful Tosses									
Age	7	8	9	10	11	12	13	14	15	
No. of Cases	106	153	126	97	102	54	184	211	142	
T-Score										T-Score
100										100
99										99
98										98
97										97
96										96
95										95
94										94
93										93
92										92
91										91
90	30									90
89										89
88	29					30				88
87										87
86	28		30	30			30			86
85						29				85
84	27	30								84
83		29	29	29		28	29	30		83
82	26									82
81		28	28	28		27	28	29		81
80					30					80
79	25	27	27	27		26	27	28		79
78					29					78
77	24	26	26	26			26	27	30	77
76					28	25				76
75	23	25	25	25	27			26	29	75
74						24	25			74
73	22	24	24	24	26			25	28	73
72						23	24			72
71	21	23	23	23	25				27	71
70					24	22	23	24		70
69	20	22	22	22					26	69
68					23	21	22	23		68
67	19	21	21	21					25	67
66					22			22	24	66
65	18	20		20	21	20	21			65
64			20					21	23	64
63	17	19			20	19	20			63
62		18	19	19				20	22	62
61	16				19	18	19			61
60		17	18	18					21	60
59	15				18	17	18	19		59
58		16	17	17	17				20	58
57	14							18		57
56		15	16	16	16	16	17		19	56
55								17		55
54	13	14	15	15	15	15	16		18	54
53					14			16	17	53
52	12	13	14	14		14	15			52
51					13			15	16	51

*For ages 7 through 9 - distances 4 ft., 6 ft., 8 ft., for ages 10 through 15 - distances 4 ft., 8 ft., 12 ft.

Table 14
T-Scores for
TENNIS BALL ACCURACY THROW (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	106	153	126	97	102	54	184	211	142	
T-Score	Total Number of Successful Tosses									T-Score
50	11	12	13	13		13	14			50
49					12				15	49
48	10	11	12	12			13	14		48
47					11	12			14	47
46	9	10	11	11	10			13		46
45						11	12		13	45
44	8	9	10	10	9			12		44
43						10	11		12	43
42	7	8			8			11		42
41			9	9	7	9	10		11	41
40	6	7						10	10	40
39		6	8	8	6		9			39
38	5					8		9	9	38
37		5	7	7	5					37
36	4				4	7	8		8	36
35			6	6				8		35
34	3	4			3	6	7		7	34
33			5	5				7		33
32		3			2	5	6		6	32
31	2		4	4	1			6		31
30		2				4	5		5	30
29	1		3	3				5		29
28		1							4	28
27			2	2		3	4	4	3	27
26										26
25			1	1		2	3		2	25
24								3		24
23						1	2		1	23
22								2		22
21							1			21
20								1		20
19										19
18										18
17										17
16										16
15										15
14										14
13										13
12										12
11										11
10										10
9										9
8										8
7										7
6										6
5										5
4										4
3										3
2										2
1										1

Table 15
T-Scores for
GRIP STRENGTH--RIGHT HAND
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	134	100	103	102	114	174	172	206	102	
T-Score	Number of Pounds									T-Score
100		65	69	84	101	123	120	138	134	100
99	58		68	83	100	121	119	136	132	99
98	57	64		82	99	120	118	135	131	98
97	56	63	67	81	98	118	117	133	130	97
96		62	66	80	97	117	115	132	128	96
95	55		65	79	95	116	114	131	127	95
94	54	61		78	94	114	113	129	125	94
93		60	64	77	93	113	112	128	124	93
92	53	59	63	76	92	111	111	126	123	92
91	52		62		91	110	109	125	121	91
90	51	58		75	89	109	108	123	120	90
89		57	61	74	88	107	107	122	119	89
88	50	56	60	73	87	106	106	121	117	88
87	49		59	72	86	104	105	119	116	87
86	48	55		71	85	103	103	118	114	86
85		54	58	70	84	102	102	116	113	85
84	47	53	57	69	82	100	101	115	112	84
83	46		56	68	81	99	100	113	110	83
82		52	55	67	80	98	99	112	109	82
81	45	51		66	79	96	97	111	107	81
80	44	50	54	65	78	95	96	109	106	80
79	43		53	64	76	93	95	108	105	79
78		49	52	63	75	92	94	106	103	78
77	42	48		62	74	91	93	105	102	77
76	41	47	51	61	73	89	91	103	100	76
75		46	50	60	72	88	90	102	99	75
74	40		49	59	71	86	89	101	98	74
73	39	45			69	85	88	99	96	73
72	38	44	48	58	68	84	87	98	95	72
71		43	47	57	67	82	86	96	94	71
70	37		46	56	66	81	84	95	92	70
69	36	42		55	65	79	83	93	91	69
68		41	45	54	63	78	82	92	89	68
67	35	40	44	53	62	77	81	91	88	67
66	34		43	52	61	75	80	89	87	66
65	33	39		51	60	74	78	88	85	65
64		38	42	50	59	73	77	86	84	64
63	32	37	41	49	58	71	76	85	82	63
62	31		40	48	56	70	75	83	81	62
61		36	39	47	55	68	74	82	80	61
60	30	35		46	54	67	72	81	78	60
59	29	34	38	45	53	66	71	79	77	59
58	28		37	44	52	64	70	78	75	58
57		33	36	43	50	63	69	76	74	57
56	27	32			49	61	68	75	73	56
55	26	31	35	42	48	60	66	74	71	55
54	25		34	41	47	59	65	72	70	54
53		30	33	40	46	57	64	71	69	53
52	24	29		39	45	56	63	69	67	52
51	23	28	32	38	43	54	62	68	66	51

Table 15
T-Scores for
GRIP STRENGTH--RIGHT HAND (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	134	100	103	102	114	174	172	206	102	
T-Score	Number of Pounds									T-Score
50			31	37	42	53	60	66	64	50
49	22	27	30	36	41	52	59	65	63	49
48	21	26		35	40	50	58	64	62	48
47	20	25	29	34	39	49	57	62	60	47
46			28	33	37	48	56	61	59	46
45	19	24	27	32	36	46	54	59	57	45
44	18	23	26	31	35	45	53	58	56	44
43		22		30	34	43	52	56	55	43
42	17		25	29	33	42	51	55	53	42
41	16	21	24	28	32	41	50	54	52	41
40	15	20	23	27	30	39	48	52	50	40
39		19			29	38	47	51	49	39
38	14		22	26	28	36	46	49	48	38
37	13	18	21	25	27	35	45	48	46	37
36		17	20	24	26	34	44	46	45	36
35	12	16		23	25	32	42	45	44	35
34	11	15	19	22	23	31	41	44	42	34
33	10		18	21	22	29	40	42	41	33
32		14	17	20	21	28	39	41	39	32
31	9	13		19	20	27	38	39	38	31
30	8	12	16	18	19	25	36	38	37	30
29			15	17	17	24	35	36	35	29
28	7	11	14	16	16	23	34	35	34	28
27	6	10	13	15	15	21	33	34	32	27
26	5	9		14	14	20	32	32	31	26
25			12	13	13	18	30	31	30	25
24	4	8	11	12	12	17	29	29	28	24
23	3	7	10	11	10	16	28	28	27	23
22	2	6			9	14	27	26	25	22
21			9	10	8	13	26	25	24	21
20	1	5	8	9	7	11	24	24	23	20
19		4	7	8	6	10	23	22	21	19
18		3		7	4	9	22	21	20	18
17			6	6	3	7	21	19	19	17
16		2	5	5	2	6	20	18	17	16
15		1	4	4	1	4	18	16	16	15
14				3		3	17	15	14	14
13			3	2		2	16	14	13	13
12			2	1		1	15	12	12	12
11			1				14	11	10	11
10							12	9	9	10
9							11	8	7	9
8							10	6	6	8
7							9	5	5	7
6							8	4	3	6
5							7	2	2	5
4							5	1		4
3							4			3
2							3			2
1							2			1

Table 16
T-Scores for
GRIP STRENGTH--LEFT HAND
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	134	100	103	102	114	174	172	206	102	
T-Score	Number of Pounds									T-Score
100		62		83	100	109	109	130	118	100
99	55	61	68	82	99	108	108	129	117	99
98	54		67	81	98	107	107	127	116	98
97		60	66	80	96	106	106	126	115	97
96	53	59		79	95	105	105	125	114	96
95	52		65	78	94	104	104	123	112	95
94		58	64	77	93	102	103	122	111	94
93	51	57	63	76	92	101	102	120	110	93
92	50				91	100	101	119	109	92
91		56	62	75	90	99	100	118	108	91
90	49	55	61	74	88	98	99	116	107	90
89	48	54	60	73	87	97	98	115	105	89
88				72	86	95	97	114	104	88
87	47	53	59	71	85	94	95	112	103	87
86	46	52	58	70	84	93	94	111	102	86
85			57	69	83	92	93	109	101	85
84	45	51		68	81	91	92	108	99	84
83	44	50	56	67	80	89	91	107	98	83
82			55	66	79	88	90	105	97	82
81	43	49	54	65	78	87	89	104	96	81
80	42	48		64	77	86	88	102	95	80
79		47	53	63	76	85	87	101	93	79
78	41		52	62	75	84	86	100	92	78
77	40	46	51		73	82	85	98	91	77
76		45		61	72	81	84	97	90	76
75	39		50	60	71	80	83	95	89	75
74	38	44	49	59	70	79	82	94	88	74
73		43		58	69	78	81	93	86	73
72	37	42	48	57	68	77	80	91	85	72
71	36		47	56	66	75	79	90	84	71
70		41	46	55	65	74	77	88	83	70
69	35	40		54	64	73	76	87	82	69
68	34		45	53	63	72	75	86	80	68
67		39	44	52	62	71	74	84	79	67
66	33	38	43	51	61	70	73	83	78	66
65	32			50	60	68	72	82	77	65
64		37	42	49	58	67	71	80	76	64
63	31	36	41		57	66	70	79	74	63
62	30	35	40	48	56	65	69	77	73	62
61				47	55	64	68	76	72	61
60	29	34	39	46	54	63	67	75	71	60
59	28	33	38	45	53	61	66	73	70	59
58			37	44	51	60	65	72	69	58
57	27	32		43	50	59	64	70	67	57
56	26	31	36	42	49	58	63	69	66	56
55			35	41	48	57	62	68	65	55
54	25	30	34	40	47	56	61	66	64	54
53	24	29		39	46	54	59	65	63	53
52		28	33	38	44	53	58	63	61	52
51	23		32	37	43	52	57	62	60	51

Table 16
T-Scores for
GRIP STRENGTH--LEFT HAND (continued)
Girls--Ages 7-15

Age	7	8	9	10	11	12	13	14	15	
No. of Cases	134	100	103	102	114	174	172	206	102	
T-Score	Number of Pounds									T-Score
50	22	27	31	36	42	51	56	61	59	50
49		26			41	50	55	59	58	49
48	21		30	35	40	49	54	58	57	48
47	20	25	29	34	39	47	53	56	55	47
46		24	28	33	38	46	52	55	54	46
45	19	23		32	36	45	51	54	53	45
44	18		27	31	35	44	50	52	52	44
43		22	26	30	34	43	49	51	51	43
42	17	21	25	29	33	42	48	50	50	42
41	16			28	32	40	47	48	48	41
40		20	24	27	31	39	46	47	47	40
39	15	19	23	26	30	38	45	45	46	39
38	14		22	25	28	37	44	44	45	38
37		18		24	27	36	43	43	44	37
36	13	17	21	23	26	35	41	41	42	36
35		16	20		25	33	40	40	41	35
34	12		19	22	24	32	39	38	40	34
33	11	15		21	23	31	38	37	39	33
32		14	18	20	21	30	37	36	38	32
31	10		17	19	20	29	36	34	36	31
30	9	13		18	19	28	35	33	35	30
29		12	16	17	18	26	34	31	34	29
28	8	11	15	16	17	25	33	30	33	28
27	7		14	15	16	24	32	29	32	27
26		10		14	15	23	31	27	30	26
25	6	9	13	13	13	22	30	26	29	25
24	5		12	12	12	21	29	24	28	24
23		8	11	11	11	19	28	23	27	23
22	4	7		10	10	18	27	22	26	22
21	3		10	9	9	17	26	20	25	21
20		6	9		8	16	25	19	23	20
19	2	5	8	8	6	15	23	18	22	19
18	1	4		7	5	14	22	16	21	18
17			7	6	4	12	21	15	20	17
16		3	6	5	3	11	20	13	19	16
15		2	5	4	2	10	19	12	17	15
14				3	1	9	18	11	16	14
13		1	4	2		8	17	9	15	13
12			3	1		6	16	8	14	12
11			2			5	15	6	13	11
10						4	14	5	11	10
9			1			3	13	4	10	9
8						2	12	2	9	8
7						1	11	1	8	7
6							10		7	6
5							9		6	5
4							8		4	4
3							7		3	3
2							5		2	2
1							4		1	1